
Feasibility Report and Environmental Assessment
For Navigation Improvements

DRAFT

East Boat Basin Cape Cod Canal Sandwich, Massachusetts



**US Army Corps
of Engineers**
New England Division

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT
AND
ENVIRONMENTAL ASSESSMENT

Department of the Army
New England Division, Corps of Engineers
Waltham, Massachusetts
August 1983

SYLLABUS

This study investigated the navigational needs at the East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts to determine the advisability of providing navigation improvements for commercial fishing and recreational boating.

Since the acquisition and widening of the Cape Cod Canal by the U.S. Army, Corps of Engineers in the late 1930's, the commercial fishing and recreational boating activities have steadily increased such that present facilities are inadequate. The existing basin becomes congested during the summer from the influx of recreational boats, and the demand from commercial fishing vessels cannot be satisfied because of limited space and depth. Construction of an expanded basin would provide the necessary harbor area to accommodate the continuing demand that has grown due to the East Boat Basin's ideal location.

Local interests envision the development of a full service harbor in conjunction with a basin expansion project. In addition to increased berthing area for recreational and commercial boats, upland development would include fish processing facilities (offloading, packing, freezing), rack storage of small recreational boats, marine supply and repair facilities, and possibly restaurants and other recreation related businesses. The potential exists for the East Boat Basin to become the major regional port, through implementation of modern efficient facilities.

Several alternatives, similar in concept, were analyzed in an attempt to find the improvement plan that best addresses the needs of commercial fishing and recreational boating activities. The results of the analyses indicated that the most feasible plan of improvement would provide a basin expansion of about 12 acres. The expansion would include berthing areas of about 4.5 acres and 1.8 acres for commercial vessels and

recreational boats, respectively. The Federal project would provide a 14-foot deep access channel 120 feet wide for a length of about 1220 feet from the basin entrance into the expansion, and a 450-foot by 160-foot turning/maneuvering area 14 feet deep. In addition to berthing areas, local interests would construct offloading areas and bulkheading for fish offloading and other activities.

The selected plan (expansion plan including the Federal project) would generate approximately \$4,027,000 in annual benefits based on increased fish landings and increased value of recreation use. The estimated project first cost would be \$9,535,000, including a \$2,592,000 first cost for the Federal project. The total annual cost would be \$1,026,000, which includes slip costs, maintenance charges and other economic costs. The selected plan was shown to be economically feasible with a benefit-cost ratio of 3.9 to 1.

Construction time for the project is estimated at 2 years. The expansion project would involve the removal of about 533,430 cubic yards of material, the bulk of which would be excavated material. Material would be transported by scow to the Foul Area in Massachusetts Bay for disposal.

The Division Engineer recommends the implementation of a Federal navigation project, in accordance with the selected plan. The recommendation is made with the provision that non-Federal interests meet certain requirements as outlined in the report. Financing of the Federal project will be in accordance with financial arrangements that are determined to be acceptable to the Administration, the Congress and local interests.



THE EAST BOAT BASIN AND SURROUNDING AREA

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

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EAST BOAT BASIN

CAPE COD CANAL

SANDWICH, MASSACHUSETTS

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FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

INTRODUCTION

The East Boat Basin is a small harbor located in Sandwich, Massachusetts, approximately 50 miles southeast of Boston. It is situated along the south bank of the Cape Cod Canal, about 3,000 feet inside the eastern end. The Cape Cod Canal is owned and operated by the U.S. Army Corps of Engineers, and provides a waterway connecting Buzzards Bay to the southwest with Cape Cod Bay to the northeast. Figure 1 shows the location of the East Boat Basin.

Over the years the East Boat Basin has developed into a very active harbor. The two major navigation-related activities occurring at the basin include commercial fishing and recreational boating. Sandwich is one of the largest fishing ports in Massachusetts, in terms of pounds of fish landed. There is also a sizeable recreational marina that provides berths for pleasure craft and a launching ramp for trailered boats.

The growth of both activities has greatly increased demand for use of the harbor, and very crowded conditions now exist. Local interests have recognized the potential opportunities presented by the possibility of

satisfying present and future demand. They have therefore proposed expansion of the East Boat Basin. The local interests anticipate that large local and regional socioeconomic benefits will result from an expansion project, in addition to increasing the national economic output.

As a first step towards expansion of the East Boat Basin, the local interests requested that the Federal Government determine if it would participate in such a project. As a result of that request this study was authorized by a Congressional resolution and subsequently initiated in July 1980.

STUDY AUTHORITY

Authority for conducting the East Boat Basin navigation study was provided by a Congressional resolution. The resolution was adopted by the U.S. House of Representatives Committee on Public Works and Transportation on 9 May 1979. The resolution authorizing the study is quoted verbatim below.

"Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report on the East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts submitted in House Document No. 168, 85th

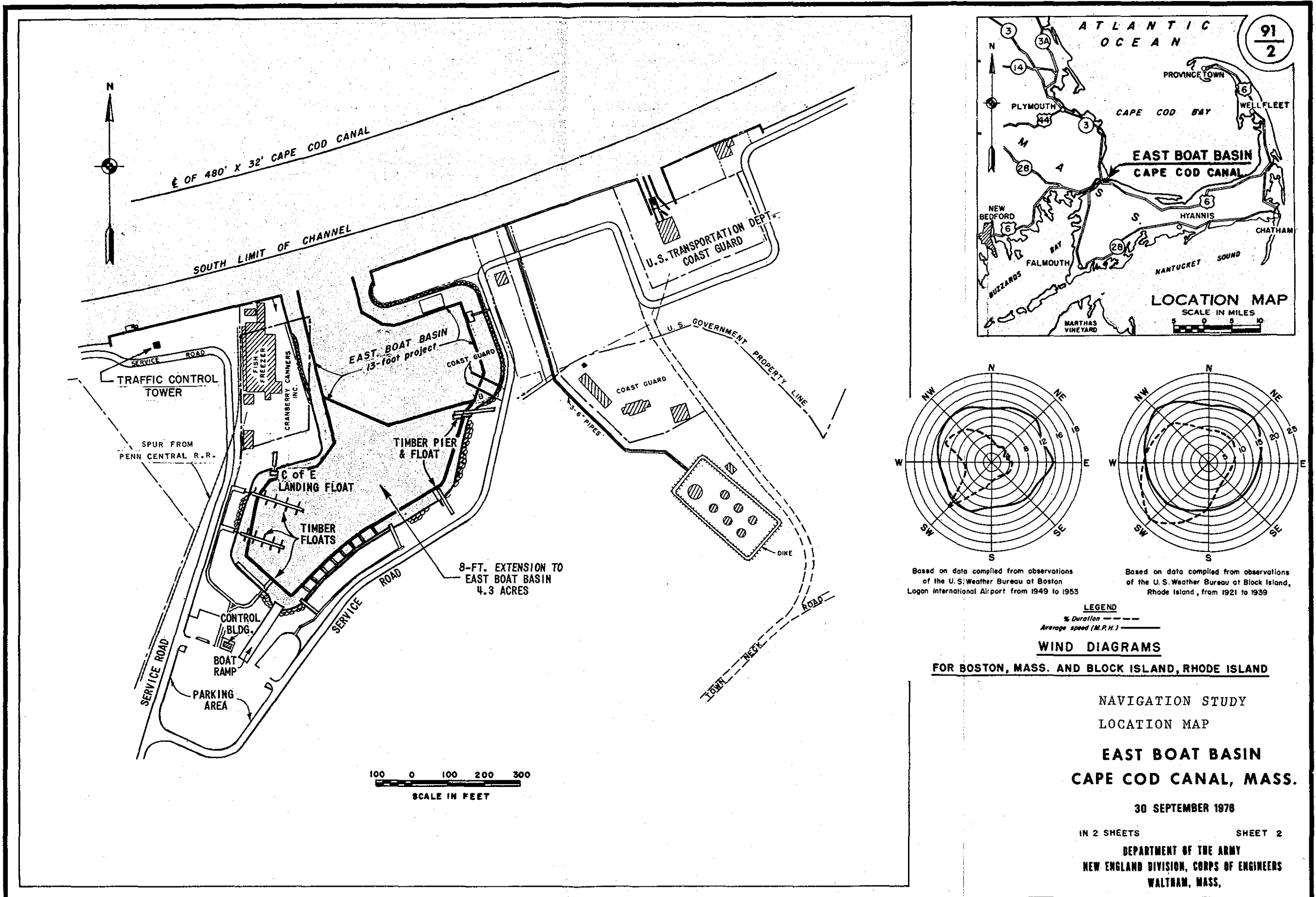


FIGURE 1

Congress, 1st Session, and prior reports with a view to determining the advisability of modifying the existing project at this time, particularly for the benefit of the existing and prospective commercial fishing and recreational boat fleets."

STUDY AREA

The geographical scope of the study was primarily limited to the East Boat Basin and the immediate area around it, including the land area to be utilized for the proposed basin expansion, and the bulkhead area along the Cape Cod Canal. Basin expansion planning was limited to the aforementioned land area since expansion beyond its limits would disrupt existing development, and local interests preferred that planning be focussed on this area. The area along the canal bulkhead was also included because activities there are interrelated with basin activities.

The study area was also considered from a broader perspective. Base conditions were established for the local Sandwich area and regionally for Barnstable County. Navigation activities occurring in the entire Cape Cod region were considered since navigation improvements at the East Boat Basin will affect the region. Disposal of dredged and excavated material will also impact areas outside the immediate study area.

STUDY OBJECTIVE AND SCOPE

This comprehensive water resources improvement study was performed to determine the cost and economic feasibility of expanding the East Boat Basin. This feasibility report is the end product of the study and presents study findings including economic feasibility, environmental impacts, project costs, level of Federal participation and recommendations concerning project implementation. This document is the final response to the study authority, and will be utilized by the Federal Government as a decision-making tool to assist it in making a final determination concerning Federal involvement in an expansion project at the East Boat Basin.

The study scope of work involved an iterative planning process that addressed four major activities to various degrees throughout the study. The activities are delineated below.

1. Problem Identification - A wide range of available information and public views were gathered, from which the base conditions were established. Analysis of the base conditions identified the navigation problems of the study area.
2. Formulation of Alternatives - A ~~wide~~ range of alternative plans was developed to address the identified navigation problems, and to promote potential opportunities.

3. Impact Assessment - Potential impacts that would result from implementation of alternative plans were determined, including economic, environmental, socioeconomic and engineering impacts.
4. Evaluation - Evaluation criteria were established based on the types of impacts. Alternative plans were comparatively evaluated in order to identify the most implementable plans.

Initial iterations of the planning process focussed primarily on problem identification, while latter iterations were more concerned with formulation, impact assessment and evaluation of alternative plans. The final outcome of the study was the selection of a most desirable plan, and a recommendation to implement navigation improvements that are economically feasible, socially beneficial and environmentally acceptable. A graphical representation of the planning process is shown on Figure 2.

PRIOR REPORTS

A number of reports have been prepared over the last 50 years for various proposed navigation projects in the Cape Cod Canal area. The earlier reports discussed briefly the East Boat Basin in conjunction with the main Cape Cod Canal project. Several reports, however, have been prepared that specifically address the East Boat Basin, and therefore it is appropriate to identify them.

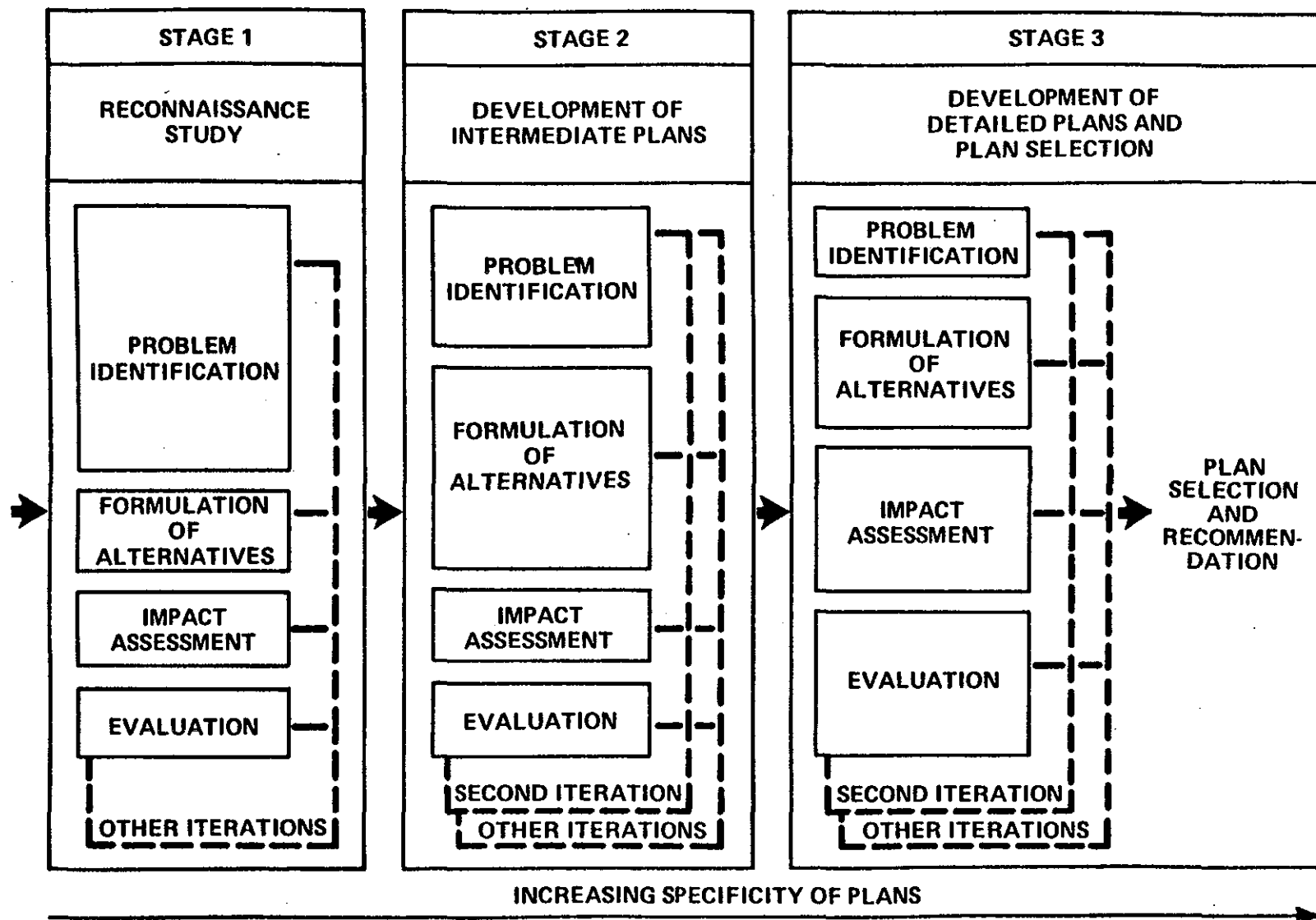


FIGURE 2- GENERAL RELATIONSHIP OF PLAN DEVELOPMENT STAGES AND FUNCTIONAL PLANNING TASKS

<u>Report</u>	<u>Subject of Report</u>	<u>Recommendation</u>
Survey, review of reports, unpublished, submitted to Congress, 23 January 1940.	Enlargement of the East Boat Basin.	Unfavorable.
Survey, review of reports, of East Boat Basin, Cape Cod Canal, Massachusetts NED, 29 June 1956.	Expansion of the East Boat Basin.	Favorable. Basin expanded to existing size in 1963.
Feasibility Study, East Boat Basin Expansion, Sandwich, Massachusetts, April 1979, Tibbetts Eng. Corp. for the town of Sandwich, Massachusetts.	Expansion of the East Boat Basin.	Favorable.
Sandwich Bulkhead Rehabilitation Study, Cape Cod Canal, Sandwich, Massachusetts, June 1980 Tibbetts Eng. Corp. for NED, Corps of Engineers.	Rehabilitation of the existing bulkhead at Sandwich.	Rehabilitate with new steel sheet piling.
Major Rehabilitation Project, Sandwich Bulkhead, Cape Cod Canal, Sandwich, Massachusetts, Reconnaissance Report. NED, October 1980.	Rehabilitation of the existing bulkhead at Sandwich.	Rehabilitate with new steel sheet piling.
East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts Reconnaissance Report for Navigation Improvements. NED, January 1981.	Preliminary feasibility determination of Federal Government participation in an expansion of the East Boat Basin.	Favorable for continuation of study.

These reports address proposed or actual modification to the existing East Boat Basin. There was no separate report recommending construction of the East Boat Basin, which was authorized under the existing Cape Cod Canal project authority as an accessory or minor feature deemed necessary.


EXISTING PROJECTS

The previously mentioned Cape Cod Canal is the only other navigation project in close proximity to the East Boat Basin. The Cape Cod Canal is an active Federally authorized project, owned and operated by the Corps of Engineers. It consists of a sea level canal, access channels, three bridges, operation and maintenance facilities, and various recreational areas. The canal has a bottom width of 480 feet and a depth of 32 feet at mean low water. The Cape Cod Canal project is shown on Figure 3.

Expansion of the East Boat Basin will not have any major impact on the Cape Cod Canal project. The existing channel width should be able to accommodate the expected increase in small boat traffic. On land, the additional basin activity may increase the use of Corps recreation areas at the East Boat Basin.

EXISTING CONDITIONS

In order to fully understand the problems and to identify potential opportunities of a study area, the existing conditions were examined. Historical trends have been reviewed to help show how present conditions developed. Discussion of regional existing conditions is also included, since implementation of a project at the East Boat Basin would impact the region.



TOPOGRAPHY AND GEOLOGY

The terrain surrounding the Cape Cod Canal consists of rolling hills; the highest is 177 feet above mean sea level. The soil is predominantly sandy with rocks and stones, and the area is well forested.

The site of the proposed East Boat Basin expansion is generally flat and largely covered with fill from the initial expansion of the Basin and the construction of the nearby power plant. Figure 4 shows the existing topographic and hydrographic conditions.

Since Cape Cod was formed during the last advance of the continental ice sheet more than 10,000 years ago, the natural soils at the site are outwash and glacial lake deposits.

Upper portions of the soil profile are predominantly glacial outwash silts, sands and gravels overlying layers of peat, clay and silt deposits. The deeper soils are highly overconsolidated, probably due to a readvance of the ice sheet after deposition.

An additional 1.5 acres area of land area to the south is not shown on Figure 4.

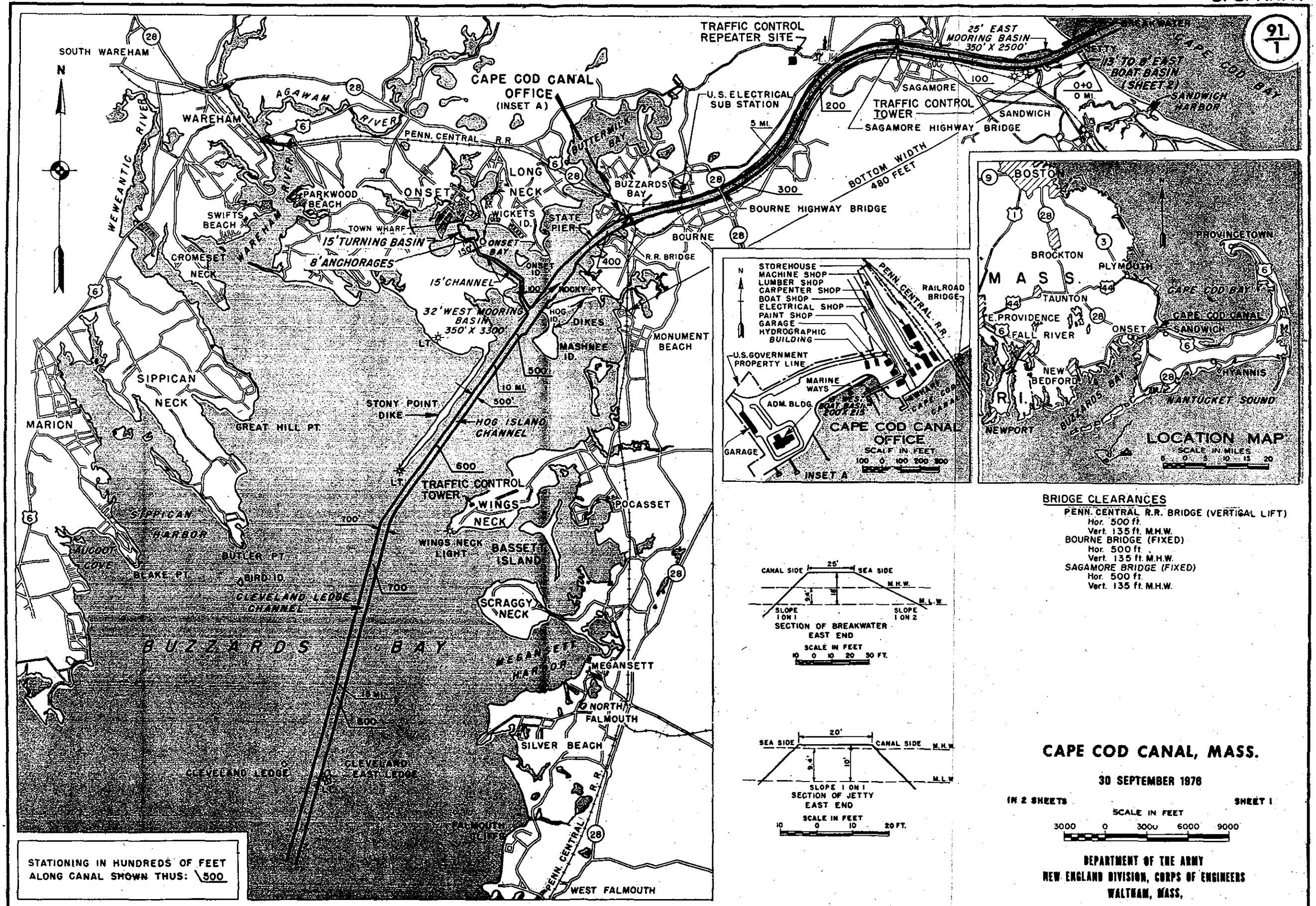


FIGURE 3

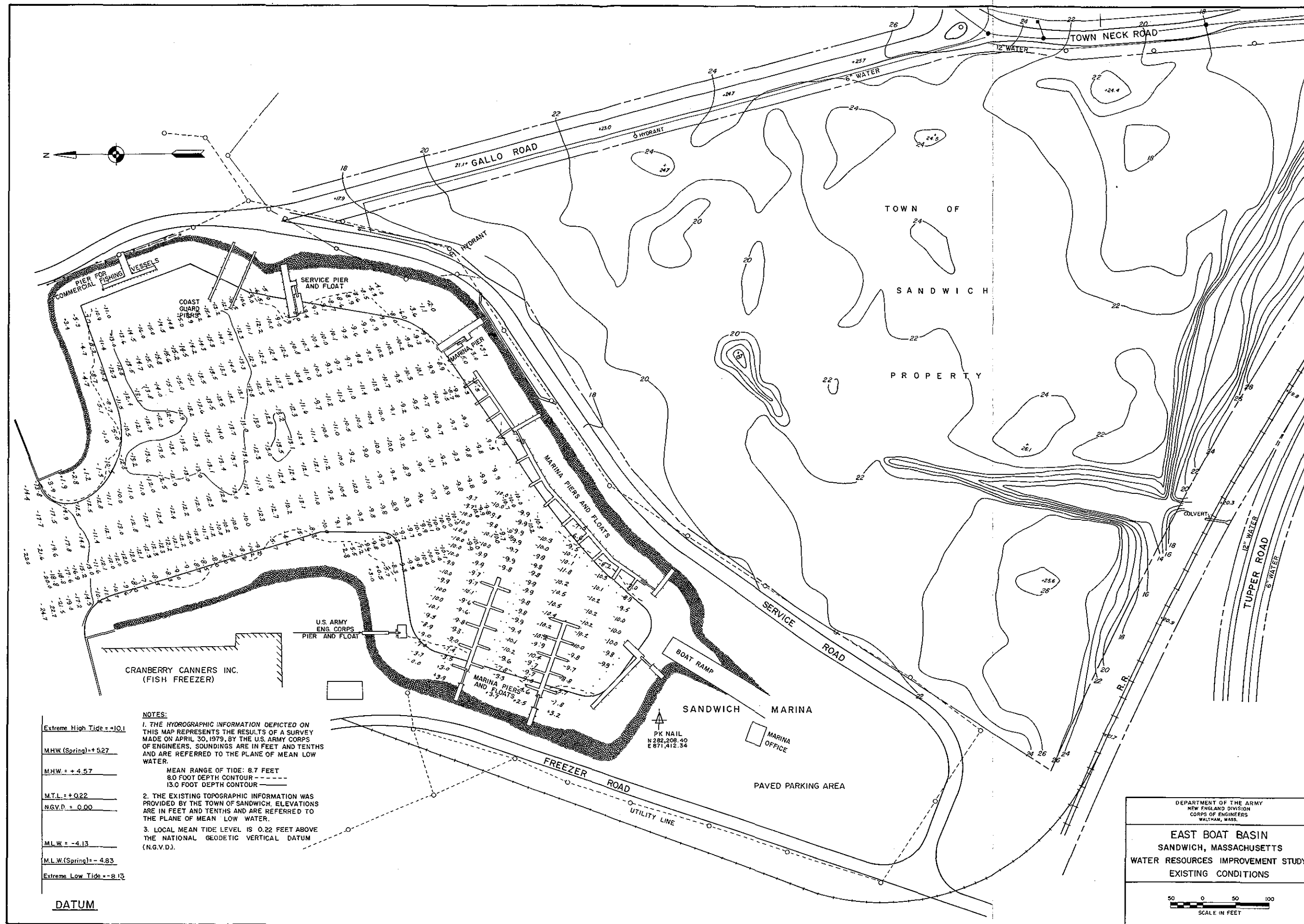


FIGURE 4

CLIMATOLOGY

The Cape Cod climate offers very comfortable spring, summer and autumn temperatures. The winters are cold, often with subfreezing readings. At all seasons, however, the climate is more moderate than at nearby inland locations. The average January and July temperatures at the East Wareham Weather Station are about 29°F and 71°F, respectively. Extreme temperatures have been recorded at -24°F and +99°F. Precipitation is well distributed throughout the year and averages about 47 inches.

AQUATIC ECOSYSTEM

The Cape Cod Canal waters are designated as SB quality, which means they are "suitable for bathing and recreational purposes including water contact sports; industrial cooling; excellent fish habitat; good aesthetic value; and suitable for certain shell fisheries with depuration."

The Canal is one of the most prolific and fruitful sport fisheries in New England. It offers many different types of fish, with the most common, in terms of catch, being Atlantic cod (Gadus morhua), Atlantic mackerel (Scomber scombrus), winter flounder (Pseudopleuronectes americanus), pollock (Pollachius virens) and tautog (Tautoga onitis). Other species caught include striped bass (Morone saxatilis), bluefish (Pomatomus saltatrix), rainbow smelt (Osmerus mordax), chub mackerel

(Scomber japonicus), blue runner (Caranx crysos), Atlantic tomcod (Migrogadus tomcod), red hake (Urophycis chuss) and American eel (Anguilla rostrata).

Fairly abundant fish with little or no commercial or sport fishing value are cunner (Tautogolabrus adspersus), Atlantic silverside (Menidia menidia), rock gunnel (Pholis gunnellus), longhorn sculpin (Myoxocephalus octodecemspinosus) and grubby (Myoxocephalus aeneus).

Alewives (Alosa pseudoharengus) gather during April, May and June at the Bournedale Herring Run, several miles west of the East Boat Basin. Schools of juvenile clupeid fish, including Atlantic herring (Clupea harengus harengus) and Atlantic menhaden (Brevoortia tyrannus) are present in the Canal during late summer and early fall.

The Cape Cod Canal contains a diversified population of benthic flora and fauna with representatives of both the Cape Cod Bay and Buzzards Bay waters. Sampling conducted in the late 1960's found approximately 100 species of invertebrates, 26 species of algae and one flower macrophyte in areas of the Canal. The primary difference from one end of the Canal to the other is abundance rather than species composition, with decreasing numbers from west to east corresponding to the transition from a more rocky bottom at Buzzards Bay to a more sandy, gravelly substrate to the east. The canal waters do not contain a large shellfish population.

TERRESTRIAL ECOSYSTEM

The site of the proposed East Boat Basin expansion is generally covered with grasses and bushes. Northern bayberry (Myrica pensylvanica) is common. Near the center of the site a small open wet area is surrounded by phragmites (Phragmites communis) and a narrow ring of saltmarsh cordgrass (Spartina alterniflora). It is doubtful that the site contains any significant wildlife habitat or value.

THREATENED AND ENDANGERED SPECIES

There are no known threatened or endangered species of plants or animals inhabiting the waters of the current East Boat Basin or the area of the proposed East Boat Basin expansion.

HISTORIC AND ARCHAEOLOGICAL RESOURCES

The area of proposed expansion is composed largely of fill from construction of the existing East Boat Basin and the nearby power plant. This fill extends to the present water table over much of the site, so intact historic or archaeological resources are extremely unlikely to exist in this location.

POPULATION

The population of Sandwich has grown at a rapid rate, far in excess of the growth rate experienced in Massachusetts, New England and the United States. Between 1950 and 1980 the town's population increased from 2,418 to 8,727, 261 percent. The rapid growth trend witnessed in Sandwich is also evident in Barnstable County. From 1950 to 1980, Barnstable County grew from 46,805 to 147,925 showing a 216 percent increase. During the same period, the state population increased by only 22 percent. Population growth trends for Sandwich, Barnstable County and the Commonwealth of Massachusetts are presented in Table 1.

Population figures for Cape Cod can be deceiving if the significant seasonal fluctuations consistent with a summer resort area are not taken into consideration. Population in Sandwich and Barnstable County begins to grow gradually in April, peaks in July and August, and declines to its year-round population level in early November. Peak seasonal population in Sandwich more than doubles the year-round population, with Barnstable County more than quadrupling its year-round population.

Table 1

Population Growth Trends

(Year Round Population)

		Percent	Barnstable	Percent		Percent
	<u>Sandwich</u>	<u>Change</u>	<u>County</u>	<u>Change</u>	<u>Massachusetts</u>	<u>Change</u>
1950	2,418		46,805		4,690,514	
1960	2,082	-13.9	70,286	50.1	5,148,578	9.7
1970	5,239	151.6	96,656	37.5	5,689,170	10.4
1980	8,727	66.6	147,925	53.0	5,737,037	.8

Another characteristic of the population of Sandwich and Barnstable County is the increasing percentage of residents 65 years of age and over. Between 1970 and 1980, Sandwich's 65 and over population grew from 577 to 1,249, an increase of 117 percent. For Barnstable County the 1970 to 1980 increase was 88 percent. These figures compare to a 15 percent increase statewide for the same age category. The proportion of the population over 65 is greater in the county than either Sandwich or the Commonwealth. Table 2 provides the relevant data.

Table 2

Population Aged 65 and Over, 1970-1980

	<u>1970</u>	<u>1980</u>	<u>Percent</u> <u>Change</u>	Percent of Total <u>Population</u>
Sandwich	577	1,249	116.5	14.3
Barnstable County	16,348	30,725	87.9	20.8
Massachusetts	633,383	726,531	14.7	12.7

Source: Cape Cod Planning and Economic Development Commission

← INDUSTRY

The economic structures of the town of Sandwich and Barnstable County share a common characteristic: they are tourist-dependent economies with a seasonal peak in activity during July and August. Those employment sectors related to tourism, such as wholesale and retail trade and services, are the two largest employers in both the town and county, and continue to grow both year-round and seasonally. The wholesale and retail trade sector includes any food or clothing stores, department, chain, or discount stores, novelty shops, antique shops, gift shops, gas stations

and sales outlets for recreational equipment. The service sector includes motels, hotels, and lodgings of all types, restaurants, health care institutions, recreational and entertainment facilities, fire and police departments and all trades.

Between 1970 and 1980 the total annual average employment in Sandwich rose from 497 to 1,719, an increase of 245.9 percent. Contributing to that total increase was a combined growth in the wholesale and retail trade sector and the services sector of 144.3 percent. Employment figures for these sectors are presented in Table 3. The dependence of Cape Cod's economy on these sectors is further illustrated by the fact that in 1980, they combined to provide 54 percent of all employment offerings in the town of Sandwich.

Table 3
Employment ^b by Industry - Sandwich

	<u>1970</u>	<u>1980</u>	<u>Percent Change 1970-1980</u>
Total Employment	497	1,719	245.9
Agri., Forestry, Fishing	19	13	-31.6
Mining	0	0	0
Contract Construction	68	84	23.5
Manufacturing	14	19	35.7
Tran., Comm., Utilities	4	151	3,675.0
Wholesale/Retail	221	540	144.3
Finance, Insurance & Real Estate	49	123	151.0
Services	121	396	227.3
Government		393	-

Source: Massachusetts Division of Employment Security

Other major employment sectors in Sandwich and Barnstable County are the transportation, communication, and utilities sector; construction; services; government and finance, insurance, and real estate. Employment in these sectors is also subject to seasonal fluctuations with peaks occurring in different months of each year.

LABOR FORCE

Unemployment is a major problem facing the labor force in both Sandwich and Barnstable County. In 1981, 14.3 percent of approximately 3,151 members of the town's labor force were unemployed while 9.2 percent of the 73,022 members of the county's labor force were unemployed. The severity of the problem is obvious when a comparison is made with the statewide 1981 unemployment rate of 6.4 percent. In general, unemployment trends in Sandwich and Barnstable County have corresponded with the pattern of increase and decline of state and national unemployment trends, but at a significantly higher level of unemployment. Average annual employment data is provided in Table 4.

Table 4

Average Annual Employment, 1981

Sandwich, Barnstable County, and Massachusetts

	<u>Sandwich</u>	<u>Barnstable County</u>	<u>Massachusetts</u>
Labor Force	3,151	73,022	2,961,000
Employed	2,701	66,297	2,773,000
Unemployed	450	6,725	188,000
Unemployment Rate	14.3	9.2	6.4

Seasonal fluctuations in the Cape Cod economy intensify the problem, usually causing unemployment to soar in the off-season for tourism. In most years, the seasonal unemployment low point occurs in July or August, even though the labor force is greatly expanded. In 1981 the seasonal low point occurred in July in Sandwich at 8.9 percent unemployed. In Barnstable County, in 1981, unemployment hit its low of 5.7 percent in both May and June. The high points in unemployment occurred in January for both Sandwich and Barnstable County at 27.5 percent and 13.9 percent respectively. These unemployment rates are high in comparison to the statewide rate of 6.4 percent in January. The relevant data is presented in Table 5.

Table 5
1981 Unemployment Rate
Sandwich, Barnstable County, Massachusetts

	<u>Sandwich</u>	<u>Barnstable County</u>	<u>Massachusetts</u>
January	27.5	13.9	6.4
February	20.2	13.1	6.4
March	18.7	12.1	6.2
April	12.9	8.1	5.2
May	11.0	5.7	5.7
June	9.6	5.9	6.4
July	8.9	5.7	6.7
August	11.8	7.6	7.2
September	10.4	6.5	6.5
October	14.0	8.9	7.0
November	16.3	10.4	6.4
December	<u>18.0</u>	<u>11.6</u>	<u>6.9</u>
Average	14.9	9.1	6.4

HOUSING

The 1980 Census indicated that 91.8 percent of year-round housing units in Sandwich were single family structures. Six point one percent were structures with 2 to 9 units and about 2 percent of the structures house 10 or more families. From a total of 4,358 housing units, 3,116 are counted as year-round housing units by the planning commission. Although the census indicates a higher figure, the planning commission's number reflects those units that are actually used as year-round units and does not include those that could be used, but are not. Therefore, there are 1,242 housing units used on a seasonal basis. Table 6 shows the pertinent data.

Table 6

Housing Types
Sandwich, Massachusetts 1980

<u>Units</u>	<u>Number</u>	<u>Percent Total</u>
1	3,280	91.8
2-9	219	6.1
10 or more	70	2.0
Mobile Home/Trailer	3	.1
TOTAL (Year-round units)	3,572	100.0

Source: U.S. Census

The Cape Cod Planning and Economic Development Commission shows that the number of housing units has been increasing since 1970. From 1970 to 1980, there was a 84 percent increase in the number of housing units. A majority of the increase occurred in the construction of year-round housing units as opposed to seasonal units. This trend is expected to continue as more people permanently reside in Sandwich. Housing trends for the county and town are shown in Table 7.

Table 7

	<u>Housing Units</u>		
	<u>Sandwich, Massachusetts</u>		
	<u>1970</u>	<u>1980</u>	<u>Percent Increase</u>
Sandwich	2,368	4,358	84.0
County	65,676	99,946	52.2

Land Use

The largest portions of Sandwich and Barnstable County remain in an undeveloped natural wilderness state, a fact that accounts for much of the region's attractiveness as a vacation resort area. As Table 8 illustrates, forests and wetlands cover approximately 74 percent of Sandwich's surface area and 72 percent of Barnstable County's. Of the developed land, the largest share is devoted to residential use: 10 percent in Sandwich and 14 percent in Barnstable County. All other urban land uses including commercial, industrial, transportation, and public institutional account for a very small portion of the land area throughout Cape Cod. Agriculture and open space cover about 7 percent of Sandwich's land area and 8 percent of the county's. It is important to note that 9,416 acres in Sandwich or 33 percent of the land is controlled by the Federal Government at Camp Edwards and Otis Air Force Base.

Table 8

Land Use, 1972Sandwich and Barnstable County

	<u>Sandwich</u>		<u>Barnstable County</u>	
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
Urban Land*	4,431	15.5	48,869	17.2
Residential	2,761	(9.7)	39,986	(14.1)
Transportation	311	(1.1)	2,801	(1.0)
Commercial	54	(.1)	2,287	(.8)
Industrial	81	(.3)	489	(.2)
Open and Public	1,224	(4.3)	3,356	(1.2)
Mining, Waste Disposal	199	0.6	1,659	0.6
Agriculture, Open Land	2,063	7.2	22,848	8.1
Outdoor Recreation	684	2.4	6,255	2.2
Wetland	2,282	8.0	47,841	16.9
Forest Land	18,824	66.0	156,097	55.0
Total	28,484	100.0	238,569	100.0

*The indented items sum, providing the total under Urban Land.

Source: Cape Cod Planning and Economic Development Commission

Because such a large percentage of the region remains undeveloped, and there are projections for accelerated growth of year-round and summer populations, rapid changes in patterns of land use are possible. In fact, in the past 10 to 15 years there has been a sizeable increase in residential development. It has been higher recently than in the past, primarily in residential single family homes. However, Sandwich's development is hindered by environmental considerations, lack of a large year-round population to support development and lack of adequate waste disposal sites.

HISTORIC DEVELOPMENT OF THE BASIN

The history of the East Boat Basin begins with the project that enlarged the Cape Cod Canal, which had originally been constructed by private interests as an aid to navigation. It became an uneconomical investment and was purchased by the Federal Government in 1928 for \$11,500,000. The as-bought canal was deemed inadequate for safe use by the increasingly larger deep draft vessels using it, so the Federal Government proposed widening it. The canal was widened to a bottom width of 480 feet and deepened to 32 feet at mean low water. Construction of the widening project was performed between 1935 and 1940 at a cost of \$19,925,550. Included in this construction was the East Boat Basin.

The basin was constructed to provide facilities for maintenance and repair of floating plant in connection with the operation of the canal. The basin, as originally dredged, was approximately 150 feet square at a depth of 10 feet below mean low water. A bulkhead, which is not specifically mentioned in the House Document recommending widening of the canal, was constructed in 1937 as a minor feature deemed necessary. The bulkhead construction cost was \$140,928.84. It is located along the Cape Cod Canal on both sides of the entrance to the East Boat Basin and is still in place with minor additions and repairs made to it over the years. No bulkhead has ever been constructed within the basin. The basin was subsequently enlarged to serve as a harbor of refuge for small boats during northeasterly storms.

The enlarged basin is shown in Figure 5. It was about 2.7 acres in area with a project depth of 13 feet below mean low water. Commercial use of the bulkhead began shortly after its construction. The Canal Fish & Freezing Company (now Canal Marine, Inc.) began to offload fish on the west side of the basin entrance. In 1937 an easement for laying of pipelines between the bulkhead and a tank farm was granted by the Corps for the purpose of offloading petroleum products. Subsequent commercial usage of the bulkhead increased from 1952 to 1956 when three additional fish packing businesses obtained leases, causing many fishermen to realize the convenience of permanently operating out of the basin. During 1954 the fishing fleet using the basin consisted of about 7 vessels in the winter and 25 vessels in the summer. Typical fishing vessels of the period were 40-60 feet long with drafts of 6-8 feet.

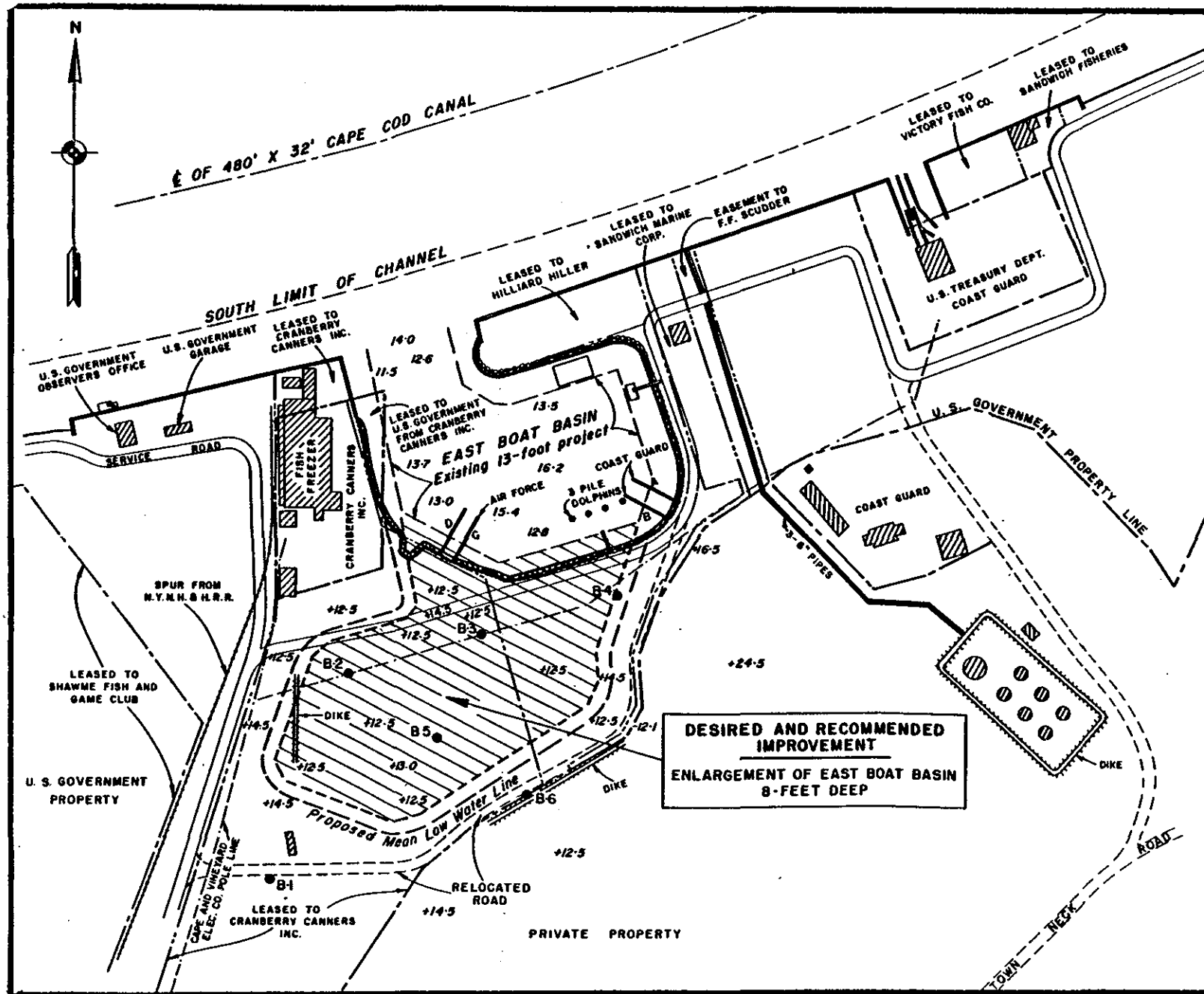


FIGURE 5 - EAST BOAT BASIN PRIOR TO 1963 EXPANSION

A sizeable number of recreational craft also utilized the basin on a regular basis. Many transient vessels found the basin a convenient stopover point. The increased usage prompted local interests to desire an enlarged boat basin that would provide a more adequate harbor of refuge.

In 1963 the basin was again enlarged to present dimensions at a cost of \$245,700. An area of 4.3 acres was added to the existing 2.7 acres for a total of about 7 acres. The project depth for the new portion was 8 feet below mean low water. The perimeter of the basin consists of riprap revetment with slopes ranging from 1 vertical : 2 horizontal to 1 vertical : 4 horizontal. Local interests were required to provide a suitable public marina, and a boat launching ramp for trailered boats. These are the physical conditions of the East Boat Basin as it exists today.

THE COMMERCIAL FISHING INDUSTRY AT SANDWICH

The commercial fishing industry began at the East Boat Basin shortly after completion of the canal bulkhead when the Canal Fish & Freezing Co. was established. The largest growth of the industry occurred between 1952 and 1956 when the Victory Fish Co., Cape Cod Shellfish Co. and the Clearwater Fish Co. were established. This brought the total number of fish offloading businesses to four, including the Canal Fish & Freezing Co.. These businesses have subsequently changed hands many times, but the total number of businesses and their locations have remained the same since 1956. Available records indicate that 7,200 tons (14.4 million pounds) of

fish valued at \$700,000 were landed at Sandwich in 1955. An additional 300,000 pounds of shellfish valued at \$100,000 were also landed there, for totals of 14.7 million pounds and \$800,000.

The commercial fishing industry at the East Boat Basin is composed of three distinct parts, the offloading businesses, the local fishing fleet and the transient fishing fleet. The characteristics of each segment are discussed in order to obtain a feel for the unique situation that exists.

The offloading businesses are discussed first since it appears that they provided the original stimulus for development of the fishing industry at the East Boat Basin.

← Fish Offloading Businesses

Canal Marine, Inc. - Canal Marine, Inc. is located on the west side of the entrance to the basin. This facility was the first one established for fish offloading back in 1937. Canal Marine owns the land it is on, since it was located at that site prior to the canal being widened when the firm was apparently involved in the cranberry industry. A small piece of Canal Marine property is leased to the Corps, where the East Boat Basin cuts through the property. In turn, the Corps leases a bulkhead tract to Canal Marine for the purpose of offloading fishing boats.

Canal Marine is a volume business dealing in non-traditional species. Herring is the primary species, but mackeral, hake and squid are also handled. Fishing boats are offloaded by means of conveyors or pumping. The fish can be directly loaded into trucks for immediate distribution to processing plants or they can be stored in the 3.5-million pound capacity freezer for distribution. The fish is distributed primarily to overseas markets. Canal Marine contracts with large offshore boats (80'-120') to obtain fish. There are no Sandwich-based boats that deal with Canal Marine, Inc..

Atlantic Coast Fillet Company, Inc. - This firm is located on the east side of the basin entrance on the neck of land between the basin and canal. This business leases its space from the Corps for the purpose of offloading fish.

Atlantic Coast Fillet Co., Inc. is a wholesaler of groundfish and some scallops. Species include yellowtail flounder, blackback flounder, cod and haddock. The fish is boxed on board the fishing boats or at the facility and is then distributed to processors in New Bedford, New York, Pittsburgh and the southern U.S. Atlantic Coast. Atlantic Coast Fillet Co. is the only facility that services the local fleet, which represents somewhat less than 50 percent of its total number of landings.

Joe's Lobster Mart, Inc. - This company is located just to the east of the former Coast Guard Marine railway. It also leases its space from the Corps.

This business deals in live lobster, which are distributed to the regular fish markets and directly to restaurants. About 95 percent of the catch is obtained from large offshore lobster boats (75'-80') and from draggers that have accidentally caught lobsters in their nets. The remaining 5 percent is inshore lobster provided by the Sandwich fishing fleet.

R&D Seafood Emporium, Inc. - R&D Seafood Emporium, Inc. is located about 100 feet east of Joe's Lobster. It also has a lease from the Corps. R&D began operations in August 1980, when it obtained control of the expired lease held by Sandwich Fisheries, Inc.

This distributing business is similar to that of the Atlantic Coast Fillet Co., Inc., except that only larger offshore boats (80'-120') are offloaded. Sandwich-based boats are not offloaded at R&D. R&D also operates a small retail outlet at the same location.

Virtually all landing of fish at the East Boat Basin is performed on the Corps' bulkhead at the four offloading facilities. Small amounts of fish, primarily lobster, are offloaded by small-boat fishermen themselves. Table 9 shows a breakdown of the types of species and amounts of each landed at Sandwich in 1977.

Table 9

Species, Pounds and Value Landed
All Boats
Sandwich, Massachusetts, 1977

<u>Species</u>	<u>Pounds</u>	<u>Value</u>
Yellowtail	2,700,000	\$1,377,000
Sea Scallop	670,198	1,110,000
Blackback	2,275,809	780,000
Cod	1,609,578	466,000
Bluefin Tuna	382,057	414,000
Lobster	277,656	455,468
Sea Herring	5,795,011	201,000
Haddock	541,286	180,000
Fluke	288,333	173,000
Ocean Dab	239,293	79,000
Greysole	134,146	55,000
Sand Dab	229,167	55,000
Monk Tail	148,649	55,000
Squid	76,941	23,000
Pollock	123,529	21,000
Scup	48,148	13,000
Sea Bass	12,125	9,000
Whiting	38,580	4,000
Crab	16,000	4,000
Hake	8,696	2,000
Wolf Fish	21,164	2,000
Halibut	930	2,000
Mackerel	5,883	2,000
Cusk	5,882	1,000
Butterfish	2,702	1,000
Other	5,000	1,000
Total	15,606,763	\$5,485,468

Source: An Economic Profile of the Cape and Island Fisheries, Cape Cod Planning and Economic Development Commission, 1978.

Sandwich is the second largest fishing port on Cape Cod in terms of pounds of fish landed. It is the fifth largest in Massachusetts and was listed as the 47th largest in the country in 1980, according to the National Marine Fisheries Service. Table 10 compares Sandwich landings for 1980 to other Massachusetts ports.

Table 10

b
Fish Landings by Port, 1980

<u>Port</u>	<u>Pounds</u>	<u>Dollars</u>
Gloucester	210,000,000	34,700,000
New Bedford	99,600,000	71,300,000*
Boston	34,400,000	12,300,000
Provincetown	25,800,000	10,400,000
Sandwich	14,200,000	7,400,000

*New Bedford has the largest ex-vessel value of fish landed, since a large percentage of the landings consist of higher priced scallops.

Source: Fisheries of the United States, 1980, National Marine Fisheries Service, April 1981.

Sandwich's ideal location for offloading fish can be evidenced by the quick increase in the amount of fish landed from 1975 to 1978, when the amount leaped from 6,400,000 pounds to 19,000,000 pounds, an increase of 197 percent in 4 years.

A decline in fish landings occurred at Sandwich in 1980, although other major Massachusetts fishing ports increased their amounts of fish landed. Table 11 compares annual fish landings of the five largest ports in Massachusetts.

Table 11

6
Fish Landings By Port, 1977-1980

Millions of Pounds

<u>Port</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Gloucester	150.9	185.4	160.2	210.0
New Bedford	75.5	71.9	86.0	99.6
Boston	22.2	27.3	30.3	34.4
Provincetown	17.9	19.9	23.4	25.8
Sandwich	15.3*	19.0*	19.1	14.8

Sources: Fisheries of the United States, 1980, National Marine Fisheries Service, April 1981.

Northeast Fisheries Center, Woods Hole, Massachusetts.

National Marine Fisheries Service, Resource Statistics Office, March 1981.

*State of Massachusetts, Division of Marine Fisheries

There are several possible contributing factors which may have caused the recent decline. During the 1978 and 1979 peak period, the offloading facilities might have overreached their capability in handling fish, causing lines of waiting boats. Having experienced this problem, operators of many of the large transient vessels may have decided to switch to a less congested port to offload. Major increases in the price of fuel may have caused the fishing fleet to reduce the number of fishing trips, resulting in decreased landings. Other possible contributing factors include market condition impacts or fluctuation in the amount of seasonal marine resources such as herring, which accounts for about one-third of the total pounds landed. Future landings, however, should reflect Sandwich's potential to become a fully developed fishing port.

← Local Fishing Fleet

The local fishing fleet at Sandwich consists of about 40 boats year-round. Table 12 shows the make-up of the Sandwich fishing fleet in both the summer and winter.

Table 12

Composition of Sandwich-Based Fleet

<u>Type of Boat</u>	<u>Number of Vessels</u>	
	<u>Summer</u>	<u>Winter</u>
Lobster	20	0
Trawler	18	29
Scallop	<u>6</u>	<u>6</u>
TOTAL	44	35

Source: Harbormaster, Sandwich East Boat Basin

The terms summer and winter are used in Table 12 to define the various fishing and recreational boating seasons. Since lobstering and recreational boating impact upon the composition of the Sandwich-based fishing fleet during different times of the year, the composition of the fleet is discussed for two half-year periods, summer (April-September) and winter (October-March).

During summer the East Boat Basin is very active with recreational boating activity. Summer is also the peak lobstering time of year. These two activities restrict the number of larger commercial fishing

boats that can use the basin to about 20 or 25. Other fishing boats that desire to use the basin must homeport at other ports on Nantucket, Martha's Vineyard, Cape Cod or Block Island.

The winter season brings a cessation of lobstering and recreational boating. These boats are taken out of the water and some of them are stored on the Sandwich Marina parking lot for the winter. This frees up mooring space during the winter for use by fishing boats from ports that freeze up. About 11 trawlers, draggers and scallopers use the basin as their homeport in the winter and moor in areas vacated by the lobster boats and recreational boats. Additional transient fishing boats also use the basin during the winter on a short term basis, e.g., seiners come up from New Jersey or North Carolina to fish for herring. Therefore, the actual number of boats using the East Boat Basin during the winter may be greater than indicated in Table 14, but would fluctuate daily.

Table 13 gives the number of boats that use the East Boat Basin as a homeport during various seasons, and the appropriate number of crew who work these boats.

Table 13

Total Number of Boats Homeporting at Sandwich and Crew

<u>Season</u>	<u>Type of Boat</u>	<u>Number of Boats</u>	<u>Crew per Boat</u>	<u>Total Crew</u>
Summer	Lobster	20	1.5	30
	Trawler	18	3.2	58
	Scallop	6	6.5	39
Winter	Trawler	8	3.2	26
	Scallop	<u>3</u>	<u>6.5</u>	<u>20</u>
TOTAL		55		173

NOTES:

1. The number of boats under winter refers only to the additional boats that homeport at the basin during winter. These boats utilize space vacated by the lobster and recreational boats.
2. The crew per boat values came from the source: An Economic Profile of the Cape and Island Fisheries, Cape Cod Planning and Economic Development Commission, 1978.

The Sandwich fishing fleet is comprised of mostly older boats, some over 50 years old. The typical larger vessel size is about 45 feet to 55 feet in length, which is small by today's standards. The local fleet is also in somewhat of a decline due to the inefficiencies of the East Boat Basin. Its restrictive size and depth limitations preclude the local fishermen from investing in newer larger vessels which they have expressed interest in doing. The possibility exists for investing in smaller, new, more efficient boats, but several factors discourage implementation of this alternative. Today's economic conditions require that fishermen utilize the economy of scale in order to keep up with rising fuel costs and mortgage costs. Another factor is the inefficiency of mooring within the basin. Rafting of many boats together, such as in the East Boat Basin, results in delays in getting to the fishing grounds. This situation would remain even if new boats were rafted. Small boats must wait for larger boats to be unloaded, resulting in further delay, because the bulkhead finfish dealers are high-volume oriented and prefer to offload the larger transient vessels first. The result of the inefficiencies, lack of proper facilities and other factors is minimal opportunity for local fishermen to upgrade the fleet. Without improvement of the existing basin the local fishing fleet will gradually decrease in productivity.

The Sandwich fishing fleet operates on a daily basis along the inshore areas of Cape Cod Bay and south of Cape Cod, and around the cape islands. The fishing grounds are shown in Figure 6. Species fished for

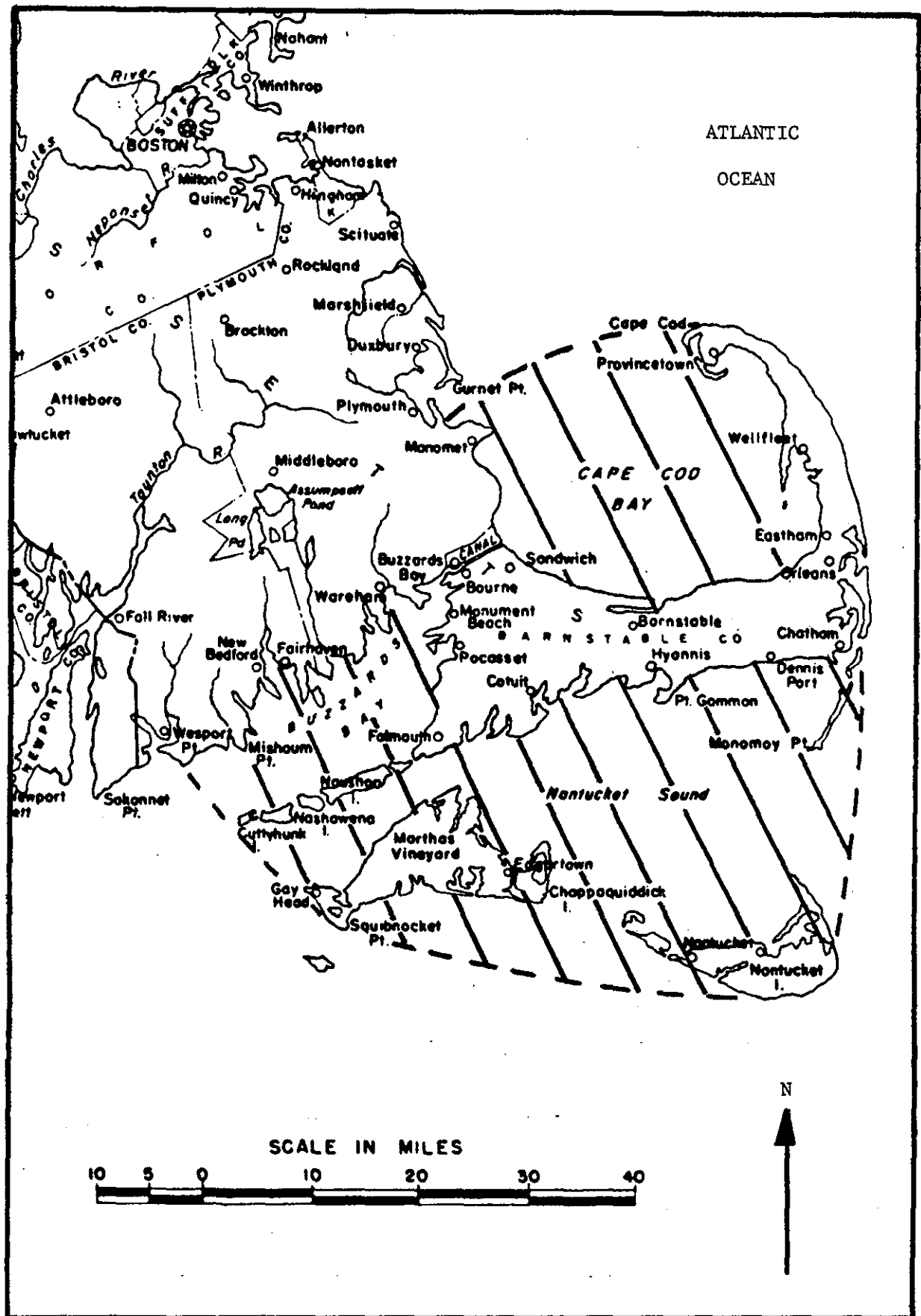


FIGURE 6 - SANDWICH FLEET FISHING GROUNDS

are mostly flounder, other groundfish, scallops and lobster. The local fishing fleet provides approximately 25 percent of the fish landed at Sandwich. Table 14 gives this breakdown for the year 1977.

Table 14

✓ Fish Landed at Sandwich - Sandwich and Non-Sandwich ^Bboats, 1977

<u>Home Port</u>	<u>Pounds Landed</u>	<u>Value</u>
Sandwich	3,368,143	\$1,558,495
Other	<u>12,238,620</u>	<u>3,926,973</u>
TOTAL	15,606,763	\$5,485,468

Source: An Economic Profile of the Cape and Island Fisheries, Cape Cod Planning and Economic Development Commission, 1978.

Inshore lobster for the most part is offloaded by the fishermen themselves. Finfish fishermen can only offload and sell their catch to one buyer, which is somewhat of a disadvantage in marketing their fish. The fish buyers operate on a large volume basis servicing mostly larger transient vessels. Therefore, prices offered to fishermen for their fish are commensurate with a large volume business. The local fishermen, who have small boats and therefore land less fish, must accept the price

offered. They, however, do not have the economy of scale to offset the lower volume-based prices. The wholesaler cannot increase the prices for the local fleet, since that would be poor business practice.

Existing offloading and mooring conditions also present problems to the local fishing fleet. When fishing vessels, particularly the smaller, older, Sandwich boats, offload along the bulkhead they get banged against it from the wakes of passing boats and ships. The smaller boats also spend a large amount of time maneuvering in the canal while waiting for large fishing vessels to complete offloading operations. This causes potential collision problems; however, the Sandwich boats must wait to offload in order to minimize possible spoilage of their catch. Mooring of fishing vessels in the basin has developed haphazardly. Each fisherman must stake out or obtain his own place and method of mooring. A cooperative effort on the part of the fishermen has found that rafting of vessels from the one large pier is most efficient use of existing space. This system however is unsafe, causes delays and damages vessels.

← Transient Fishing Fleet

The third component of the Sandwich fishing industry is the transient fishing fleet, which consists of boats that homeport elsewhere but find Sandwich a convenient location for offloading fish. Homeports of these transient vessels most often are New Bedford-Fairhaven, Provincetown and Point Judith in Rhode Island. Vessels from nearly all the regional ports

and even boats from Maine to North Carolina find Sandwich a good location to offload when moving between the fishing areas north and south of Cape Cod.

Transient vessels are mostly large (70'-110') offshore vessels that fish the Georges Banks area. Species landed by these boats include herring, flounder, other groundfish and lobster. The transients offload at all of the bulkhead wholesalers, providing 75 percent of the total amount of fish landed at Sandwich.

Some of the fishing vessels presently homeporting in other ports, (e.g. Fairhaven), have owners who reside in Sandwich and would probably homeport in Sandwich if the facilities were there. Also, it is very likely that a sizeable number of vessels from other ports would transfer to the East Boat Basin. Not all would transfer, since they only fish in the region on a seasonal basis, (e.g. for herring during winter), and then return to their own region to fish during other seasons.

Large transient boats encounter the same problems on the bulkhead as do the smaller local boats, but damage is less because their larger size enables them to withstand more punishment. Large transients do not utilize the basin to layover because of inadequate space and depth. As stated earlier the large transient vessels usually get priority for offloading. The transients are also more flexible and can take their catch to other ports if market conditions dictate or it is too crowded at Sandwich.

The transient fishing fleet is an important component of the Sandwich fishing industry for two reasons. It provides by far the largest percentage of fish landed at Sandwich, and it indicates how favorable a location Sandwich is for offloading fish. A logical assumption can then be made that a good offloading location is also a good homeport location, should the proper facilities be available.

REGIONAL FISHING PORTS

The Cape Cod region has a sizeable commercial fishing industry. A survey was made of four major commercial fishing harbors within close proximity to Sandwich. These ports are New Bedford, Provincetown, Chatham and Plymouth. Included in the survey were fishing fleet characteristics, types of marine resource landed, existing facilities and the possibility of future improvements in the harbor. Table 15 shows the amount of total marine resource in millions of pounds landed at each port, including Sandwich, for the past several years.

Table 15

✓
Fish Landed ^a 4t Regional Ports

<u>Port</u>	<u>Millions of Pounds</u>			
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
New Bedford	75.5	71.9	86.0	99.6
Provincetown	17.9	19.9	23.4	25.8
Chatham*			11.5	13.8
Plymouth*			3.5	3.9
Sandwich	15.3	19.0	19.1	14.2

Source: National Marine Fisheries Service

*Operations Division, NED, Corp of Engineers

The locations of the four regional ports and other major fishing ports are shown in Figure 7. Characteristics of the regional fishing ports are discussed below.

New Bedford - New Bedford Harbor also includes fishing vessels homeporting in Fairhaven, which lies across the harbor from New Bedford. Approximately 200 fishing vessels ranging from 50 to 110 feet in length homeport in New Bedford Harbor. They are mostly large offshore trawlers

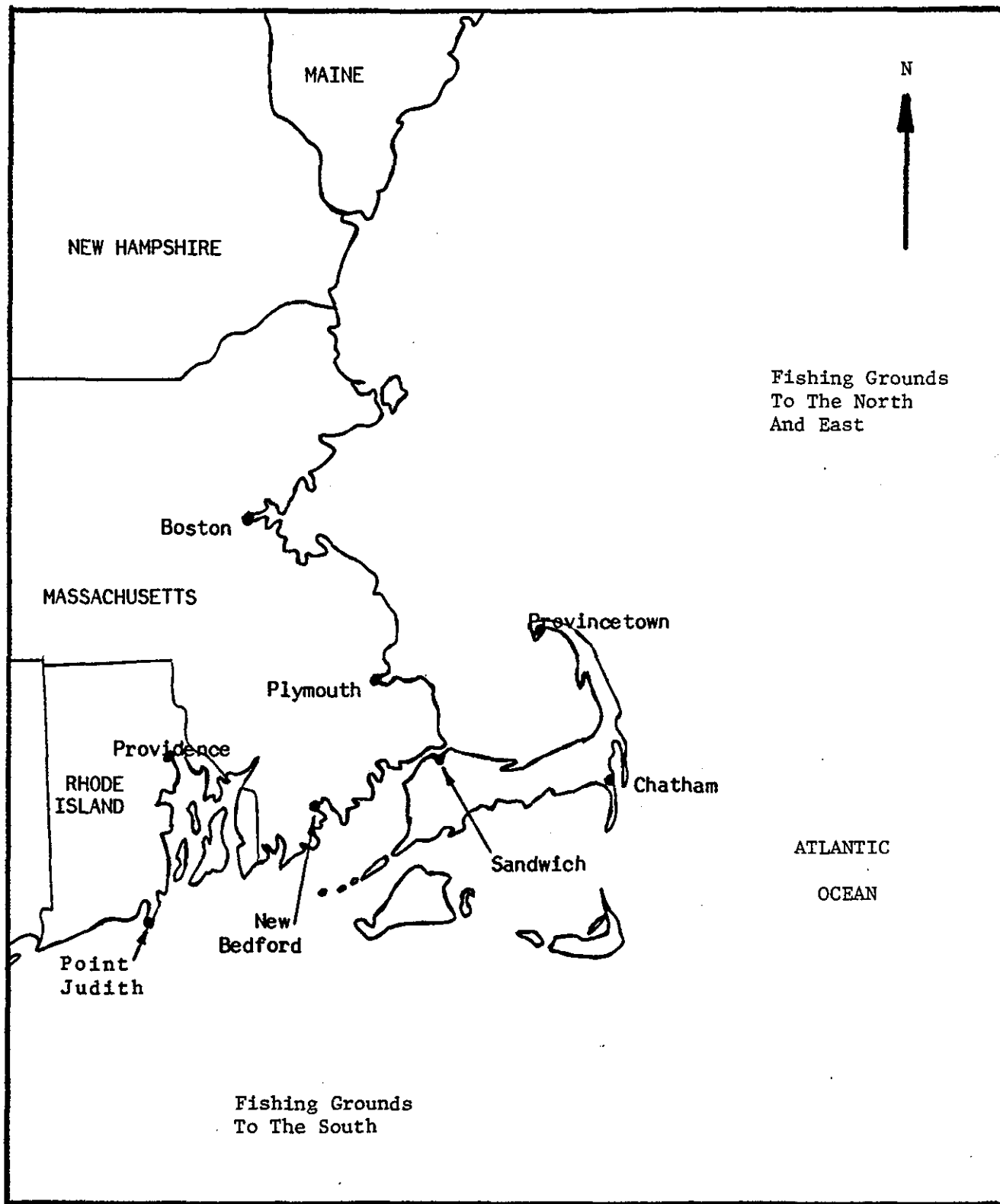


FIGURE 7 - SANDWICH AND NEARBY FISHING PORTS

that fish for scallops, haddock, flounder and cod. This fishing fleet, is the largest of those discussed in this regional analysis, and is very modern with most vessels being less than 10 years old.

Improvement of the existing navigation system is not foreseen in the near future. New Bedford and Fairhaven Harbors were the subject of a small navigation study examining the feasibility of improving the existing channels. Problems in locating an economically feasible and suitable disposal site for the proposed improvement dredging caused the proposal to be dropped in 1971.

Provincetown - The Provincetown fishing fleet consists of approximately 60 homeporting vessels ranging in length from 35 to 100 feet. A large number of transient vessels also utilize the harbor for offloading fish and are usually larger averaging about 80 feet in length. The type of marine resource landed is mostly groundfish, including haddock, cod and yellowtail flounder.

Several problems face Provincetown as a commercial fishing harbor, including inadequate offloading facilities, a lack of adequate anchorage area, and a lack of protection from southwest seas. The present town pier is deteriorating and not providing adequate offloading services. The existing anchorage cannot accommodate all fishing vessels, and southwest seas are causing increased damage to the pier and to vessels not able to anchor behind the present breakwater during storms. These problems are presently the subject of a small navigation study.

Chatham - The Chatham fishing fleet consists of about 120 small boats ranging in length from 16 to 48 feet. It is basically an inshore day-type fleet utilizing longline and handline techniques for catching finfish and groundfish. Lobstering and shellfishing are also major portions of the Chatham commercial fishing industry.

Chatham is located along the outside of Cape Cod, where littoral processes cause a constant shifting of sand. The existing Chatham Harbor inlet is exposed to this action, causing it to shoal easily. The resultant tidal delays when transiting the shoal harbor entrance prevent large boats from using the harbor. Small boats historically have used the harbor.

A reconnaissance report that examined the above shoaling problem was completed in 1979. The report found that improvement of the harbor inlet was not economically justified.

Plymouth - The Plymouth fishing fleet consists of about 55 vessels ranging in length from 30 to 85 feet. Over 60 percent of the fleet is made up of 30 to 40 foot lobster boats. The remaining vessels include small draggers (40'-70') and gillnetters. The major species of marine resource landed are groundfish and lobster.

No commercial fishing development plans are being made for the immediate future; however, long range plans for fish processing facilities are being considered. A small navigation study will be performed in the near future to examine navigation problems within Plymouth Harbor.

The four regional commercial fishing ports have navigation facilities now being used to their maximum capacity. Three of the ports, New Bedford being the exception, require additional facilities in order to service the existing fleet more efficiently. The development of facilities for expansion purposes does not appear likely in the near future for any of the ports.

Of the four ports, only New Bedford has fish processing facilities. It is the most developed port and can provide all types of marine services. Plymouth is the only other port that provides a small amount of marine services. It has several marine railways for repair of vessels to 100 feet in length. Plymouth, Provincetown and Chatham provide locations to land fish, which are then trucked to processing facilities or fresh fish markets in New Bedford, Boston and New York. All other services (ice, fuel, offloading space, mooring area, etc.) are minimal at Provincetown, Plymouth and Chatham. The overall conclusion that can be reached concerning the commercial fishing industry of the region is that there is a drastic need to improve existing facilities, in addition to providing expansion capability.

all rope

✓ Recreational Boating

Recreational boating at the basin has developed concurrently with the fishing activities. Early recreational boating consisted of transients who used it to layover during extended cruises. As the Cape Cod Canal area became recognized as a potential recreational area and tourist activities increased, the East Boat Basin was seen as a potential recreational harbor. This increased recreational demand, coupled with increased commercial fishing activities in the 1950's, caused expansion of the basin to occur in 1963.

The expansion area is leased to the town of Sandwich by the Corps of Engineers. The town operates a recreational boating marina, the Sandwich Cape Cod Canal Marina, which is open to the general public. The marina provides about 72 slips for boats ranging up to 50 feet in length. Twelve of these slips are designated for transient boats. The boats actually *OH* using the slip area number about ~~82~~ *leaves in 9*, because some of the smaller boats berth between docks running parallel to the shore, and the shore.

leave in Subtracting out the 12 transients leaves in a permanent fleet of about ~~70~~ *70* boats, consisting largely of motor powered runabouts, sterndrives and some larger cabin cruisers. There are only a very small number of sailboats in the permanent fleet, including only two or three larger cruising sailboats with auxiliary power. There are no daysailers. Currents in the canal are quite hazardous, requiring sailboats to navigate

the area on auxiliary power. The hazardous currents have been the major factor in keeping the percentage of permanent sailboats lower than what might be found in a typical harbor.

The Sandwich Marina also maintains a waiting list of boats that desire to obtain berthing space at the East Boat Basin. Requests for space date back to 1973, there are now 116 boats on active file, of which about 18 are sailboats ranging from 18 to 50 feet in length. The waiting list indicates that the percentage of sailboats at the East Boat Basin would increase to about 11 percent of the fleet if facilities are provided. Table 16 shows the breakdown by size for the existing permanent fleet, boats on the waiting list and the total.

Table 16

Breakdown by Size of Sandwich Recreational Boats

<u>Boat Size</u>	<u>Existing Fleet</u>		<u>Waiting List</u>		<u>Total</u>	
	<u>Boats</u>	<u>Percent</u>	<u>Boats</u>	<u>Percent</u>	<u>Boats</u>	<u>Percent</u>
under 20'	19	27.1	44	37.9	63	33.9
21' to 24'	15	21.4	33	28.5	48	25.8
25' to 29'	10	14.3	22	19.0	32	17.2
30' to 35'	10	14.3	10	8.6	20	10.7
36' to 43'	9	12.9	3	2.6	12	6.5
43' to 50'	<u>7</u>	<u>10.0</u>	<u>4</u>	<u>3.4</u>	<u>11</u>	<u>5.9</u>
TOTAL	70	100.0	116	100.0	186	100.0

Table 16 was developed from observation of the East Boat Basin and information from the harbormaster. The table shows that most of the recreational fleet is composed of boats less than 25 feet in length, facilitating the possible use of rack storage.

The present marina facilities include a system of floating docks, a fueling station and a boat launching ramp. The recreational boat slips have electricity and water available. There are no dockside sewage pump-out facilities. A fuel dock located on the east side of the basin provides both diesel fuel and gasoline. In 1978, 100,000 gallons of each was pumped. The launching ramp provides access for trailered boats and approximately 4,000 launchings occur per year. The marina parking lot is available for on land storage of boats during the winter.

Transient recreational boats also use the basin extensively. These vessels are primarily larger cruising sailboats (25+ feet) that cruise along the New England and eastern U.S. coast. They utilize the Cape Cod Canal to shorten coastal routes and also to reduce the exposure to open ocean conditions such as those encountered along the outside of Cape Cod. The basin location is very convenient, since it is right on the cruising courses of sailboats, which use the East Boat Basin to layover at night or to wait for the tide to turn. It is a common occurrence to have many boats waiting in the basin to transit the canal with the current. Transient boats have historically used the basin as a harbor of refuge, a practice that should be maintained. In 1979, 733 transient boats used slips. This does not include transients that are required to moor in the open areas because of a lack of slips. On an average day, about 15-20 transients may be at anchor in the basin. During peak holiday periods, up to 50 transient boats at anchor fill the basin to capacity under congested

conditions. Consideration of the transient recreational fleet is important since it impacts the other permanent activities within the basin.

REGIONAL RECREATIONAL BOATING

The entire Cape Cod region is used extensively for recreational boating. The East Boat Basin is a very desirable location since it is centrally located and provides many boating opportunities. It gives easy access to Cape Cod Bay, and Buzzards Bay is reachable through the Cape Cod Canal. Over 25,000 recreational boats pass through the canal annually, and a large percentage of these stop at the East Boat Basin.

The nearest recreational harbor is in Onset Bay about 10 miles west through the canal. This harbor primarily services recreational boating in the Buzzards Bay area. The nearest recreational harbors on the Cape Cod Bay side are Plymouth, 20 miles to the north, and Barnstable, 15 miles to the southeast.

The East Boat Basin provides access to recreational boating for a sizeable area, but the present basin does not have the capacity to meet the demand for recreational boating in this area.

OTHER BASIN AND SURROUNDING ACTIVITIES

Several other activities besides commercial fishing and recreational boating occur around the East Boat Basin. These include recreational activities engaged in by the public while visiting the basin, and the operations of various businesses and Federal agencies.

The recreation area at the East Boat Basin was cooperatively developed by the Corps of Engineers, the Commonwealth of Massachusetts and the town of Sandwich. The 1963 basin expansion is leased to the town of Sandwich by the Corps of Engineers for a period of 25 years. The Commonwealth built the launching ramp, 150-car parking lot, boat slips and restroom facilities at the launching ramp. The Sandwich Marina Corporation manages the area for the town.

The Corps of Engineers owns and administers two recreation areas at the basin, one on the west side and the other on the east side. Both areas are provided with picnic tables, parking areas and restroom facilities. In addition, the Corps is planning to rehabilitate the unused Coast Guard boathouse into a day-use facility, since the Coast Guard no longer needs it and their lease has expired.

The East Boat Basin recreation area has one of the highest visitation rates in the canal area with over 250,000 annual visitors who enjoy sightseeing, fishing and picnicking. The basin provides a close-up vantage

point to observe ocean-going vessels transitting the canal, particularly large tankers en route to the adjacent power generating plant. Basin visitors also enjoy watching the commercial fishing operations and boating activities within the basin. The bulkhead allows easy access for sport fishing enthusiasts, enabling them to fish without having to climb over riprap. The provision of picnic tables allows picnickers to relax and observe the scenery while eating. The basin recreation area also provides access to the Cape Cod Canal service road, which is open to joggers and bicyclers.

Two Federal agencies have operations at or near the East Boat Basin. The Coast Guard has an administrative building approximately 600 feet east of the basin and a berthing facility for several Coast Guard boats up to 45 feet in length. The Corps of Engineers maintains a small float in the northwest part of the basin, in conjunction with the operation of the Cape Cod Canal.

Other businesses in the immediate vicinity include two restaurants and a petroleum tank farm to the southeast and the Canal Electric Company power generating plant to the west.

THE EAST BOAT BASIN BULKHEAD

The original purpose of the bulkhead and also of the East Boat Basin was operation and maintenance of the Cape Cod Canal. Use of these areas by the Corps of Engineers has declined to a point where they are not essential anymore. The Corps office at the canal does wish to retain a berth for Corps vessels inside the basin.

Use of the bulkhead is administered by the Corps of Engineers, which leases bulkhead space to various users. The lease agreements are with the fish offloaders, a petroleum operator and the U.S. Coast Guard. Canal Marine, Inc., leases from the Corps a small parcel adjacent to the canal for the purpose of offloading fishing boats. In turn, the Corps leases from Canal Marine a small parcel adjacent to the west side of the East Boat Basin entrance. Lease agreements with the fish operators are 5 years in duration. Northeast Petroleum Corporation has lease agreements allowing it to lay pipe from the canal to its upland tank farm. They also allow Northeast Petroleum to tie up to the bulkhead when offloading petroleum from barges. There is no expiration date on lease agreements with Northeast Petroleum. The U.S. Coast Guard has various lease agreements for use of piers within the basin, utility easements and maintaining of a boathouse. The boathouse lease has expired and will not be renewed. The remaining leases are generally 5 years in duration. Figure 8 shows the bulkhead use and parties that have lease agreements.

Although Corps of Engineers need for the bulkhead is nonessential at the present time, other uses have developed over the years, primarily offloading of fish. Recreational fishing, Coast Guard operations, petroleum product offloading and tying up of vessels for other purposes are also carried out. The bulkhead provides a convenient place for tugboats to tie up while waiting to assist large ships transitting the canal, for floating plant that is maintaining the canal, and for Corps of Engineers activities, including emergency operations. The Sandwich bulkhead is the only place near the east end of the canal that could be used as a base of operations in coping with emergencies (e.g. oil spills, groundings, etc.).

The bulkhead is now at such a point of deterioration that rehabilitation or replacement of it in the near future is under consideration. The Corps of Engineers has studied the problem and is developing a plan of improvement.

PROBLEM IDENTIFICATION

This section discusses what the expected future conditions would be without Federal participation in an expansion project. Navigation and related problems, which were identified through coordination with local interests, are stated. The problems were translated into potential opportunities, that if addressed, would provide increased benefit to the study area.

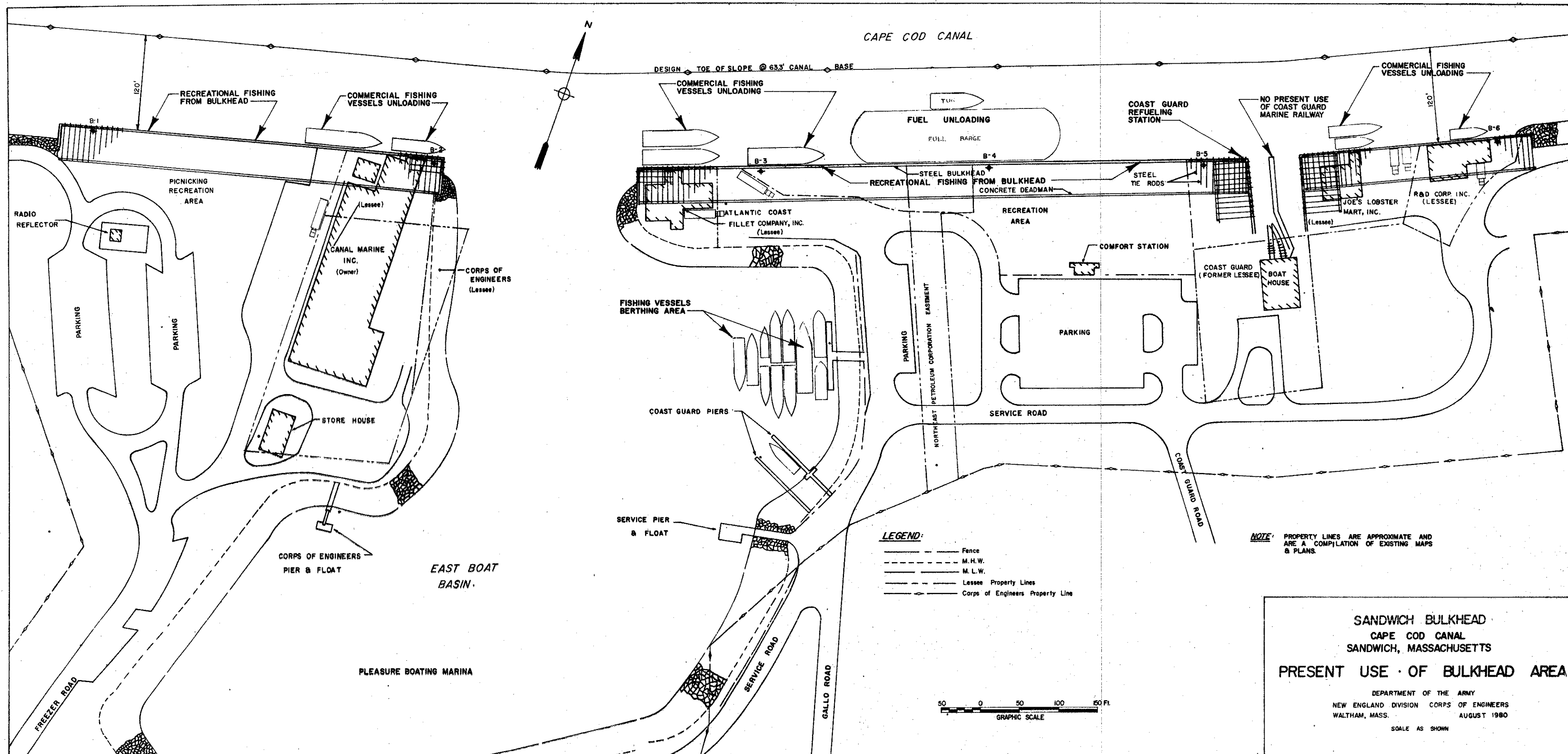


FIGURE 8

CONDITION IF NO FEDERAL ACTION TAKEN

Without implementation of the proposed expansion project, development of the East Boat Basin into a viable full service harbor is not likely. The cost of expanding the basin without Federal assistance would be economically prohibitive to the town of Sandwich and other local interests, causing them to ^{possibly} abort their basin development plans. The opportunity to capitalize on the potential growth of commercial fishing and recreational boating at the basin would be lost. Given the state of the regional fishing industry infrastructure, the chance to substantially upgrade regional facilities would be forgone.

Non-implementation of an expansion project does not preclude change in the status quo however. A cooperative planning effort by the town of Sandwich and Corps of Engineers to have the town assume management of the entire basin is underway, and implementation should occur in the near future. The town presently manages only the recreational marina portion. In conjunction with assuming management of the basin, the town would construct slips and piers in the remaining basin areas. Figure 9 shows the proposed arrangement of slips that would effect maximum utilization of the existing basin.

Although the commercial fishing fleet would not increase, benefits will accrue because of the more efficient configuration. The elimination

of rafting will reduce annual damages to vessels, and will allow more fishing time as a result of delay reduction. The recreational fleet will realize a net gain of about 42 boats, providing additional recreational benefit to the study area.

The area surrounding the basin will remain essentially the same. A small portion of the town-owned land adjacent to the basin will be used for a parking lot. The remaining area would be available for marine related or industrial purposes. The bulkhead area use is expected to remain the same; however, the physical location of activities will be reorganized in conjunction with the proposed bulkhead rehabilitation/replacement plan.

The implementation of the basin management plan by the town of Sandwich was determined to be the most likely future condition. Therefore, it was established as the without-project condition for comparison and evaluation of with-project alternatives.

PROBLEM STATEMENTS

The major problem at the East Boat Basin is the lack of adequate berthing facilities for commercial fishing and recreational boats wishing to use the harbor. This lack of facilities is preventing further growth of the fleet.

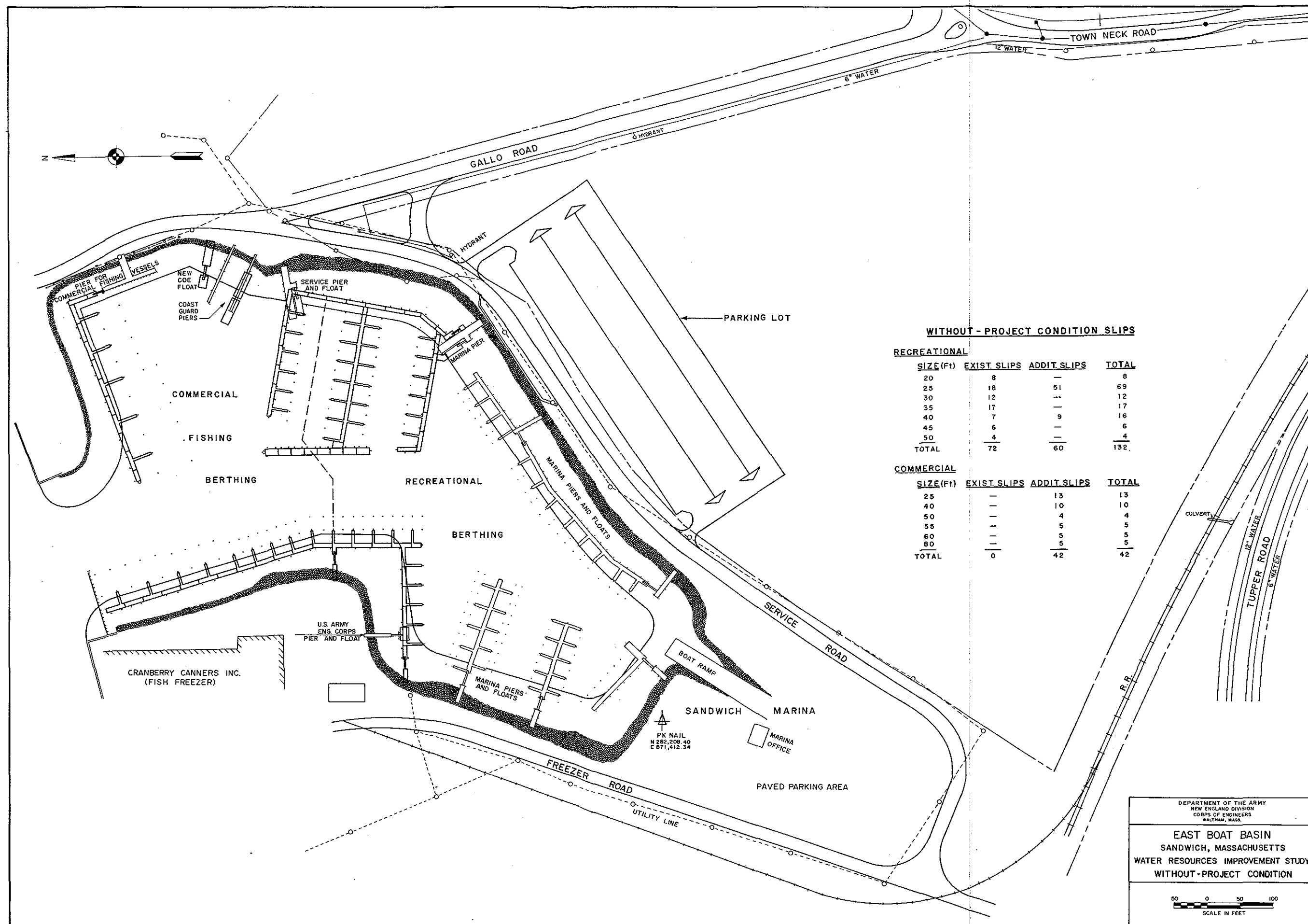


FIGURE 9

Because the basin size and depths are restrictive, larger fishing vessels cannot utilize the basin. This prohibits the local fishing fleet from upgrading to larger, more efficient fishing craft.

Offloading along the Cape Cod Canal bulkhead is hazardous, particularly for the smaller boats. Wakes from passing ships cause the boats to bang against the bulkhead, causing damage. This is not a major problem for larger boats.

The present fish offloading businesses on the bulkhead are not operating to full potential due to the uncertainty of short-term lease agreements, whose short duration do not provide incentive for the fish buyers to invest in improvements to their facilities.

There is a lack of adequate service facilities for both commercial fishing and recreational boats. The present fuel dock must serve both activities, causing traffic problems and potential conflicts. Marine supplies must be obtained elsewhere or be trucked in. Maintenance on fishing vessels is difficult to perform without a service dock and/or drydock facilities. The nearest port for making repairs is Fairhaven, Massachusetts, about 30 miles away.

Utilities such as water and electricity are not readily available to fishermen. They must ask the U.S. Coast Guard or the fish buyers for use of utilities. There are no sewage pumpout facilities in the basin.

Utilization of the commercial fishing mooring area is inefficient. Fishermen have historically staked out claims for their mooring areas using a haphazard mooring configuration that is inefficient and causes conflicts. The larger boats raft out from the large pier. The safety of rafting is questionable, and it delays fishermen waiting for other fishermen to disengage from the raft of boats. The constant abrasion and bumping of boats also causes damage.

There is need for an ice plant to supply ice to fishermen to prevent spoilage of fish catch. Ice must be ordered ahead of time and it is delivered by truck, often arriving in a melted state. Ice can be obtained from some fish buyers, but is not always readily available.

The existing riprap revetment used to stabilize and protect side slopes is inefficient.

The Sandwich fishing fleet is a day-type fleet of smaller vessels, due to the restrictive basin size. This causes marketing problems. There is no area for individual fishermen to unload and market their fish. They must deal with the bulkhead fish buyer and receive high volume prices, while not being able to offset the lower prices with economy of scale because of their small catches. Also, in dealing with only the one buyer they are restricted to selling a limited variety of species. A further complication faced by the small Sandwich boats is that they must wait for large vessels to be offloaded. The smaller boats usually offload every two to three days and waiting increases the possibility of fish spoilage.

OPPORTUNITY STATEMENTS

Implementation of an expansion project at the East Boat Basin would provide sufficient additional berthing area to more than double the existing commercial fishing and recreational boating fleets.

In addition to increasing the number of vessels, vessel size would also increase since sufficient depth and space would be available. The Sandwich fleet would be able to invest in larger boats, thereby improving its present economic condition.

Additional offloading areas within the basin would permit smaller boats to offload more safely. This would reduce the present \$1000-\$2000 of annual damage per boat inflicted upon the local fishing fleet.

The opportunity exists for the Corps of Engineers to grant longer term lease agreements with the present fish buyers. This would provide incentive for them to make capital investments to upgrade facilities. More efficient offloading facilities would generate additional fish landings.

If the basin is expanded, provision of proper marine service facilities would allow it to become a full service port. Its central location would bring fishing vessels and recreational boats in for repairs instead

of their travelling large distances to other ports. This would increase the use of the harbor and economic benefits there.

Whether the basin is expanded or not, the opportunity exists to maximize its use by implementing an efficient harbor management plan. The possible construction of docks and floats would provide an orderly configuration of individual berthing areas, maximizing the available surface area. This method would eliminate damage and delays due to rafting and reduce conflicts, since berths would be assigned to individual fishermen. Utilities could be incorporated into the berthing system, so that fishermen and recreational boaters would have easy access to them. This would leave the U.S. Coast Guard and others free of present encumbrances.

As part of the overall development of the port, additional facilities for the handling of fish, e.g., offloading, processing and freezing facilities, would be desirable. Discussions with the National Marine Fisheries Service and Massachusetts Division of Marine Fisheries have indicated that the limiting factor in the region is port facilities, both water and on land. Their provision would help to ease the present shortage of facilities and provide a catalyst for future growth of the fishing industry.

Incorporation of bulkheading into a basin expansion project would allow maximum utilization of the available area. Its use should be

considered, particularly for alternative plans that may be limited by the available area.

Expansion of the basin provides an opportunity for the local fleet to market their own fish. An area open to all small fishermen could be set aside to allow them to market fresh fish and also nontraditional species. The bulkhead operators and any new buyers within the basin would retain their large volume business from bigger vessels. This would allow local fishermen to exploit the fresh fish market, prevent spoilage due to offloading delays, and fish for nontraditional species should they so desire.

Other potential opportunities include the use of rack storage for small boats, the socioeconomic benefits to the study area, e.g., jobs, taxes, leases, ramp and dock fees, the possibility of operating charter fishing boats, and establishment of a laboratory for the Massachusetts Division of Marine Fisheries.

PLAN FORMULATION

Consideration of the problems and opportunities identified in the previous section led to the establishment of the planning objectives. Any planning constraints that limited the scope of planning were identified. Plans of others were considered to identify potential conflicts between plans, and to assure consistency of planning in the area. A range of

alternative plans were formulated to address the planning objectives in light of the planning constraints. Plan formulation included the establishment of formulation and evaluation criteria, identification of management measures and plan formulation rationale. The plan formulation and evaluation process is contained in Appendix 2, Formulation, Assessment and Evaluation of Plans. Assessment and comparative evaluation of alternative plans resulted in the selection of a plan that best addresses the problems and opportunities of the study area.

PLANNING OBJECTIVES

Previous sections presented problems specific to the study area and the opportunities that would result if the various problems are addressed. Based on the identified problems and opportunities, planning objectives were established to help direct the formulation of alternative plans that best address the problems and needs. Planning objectives were also considered during the evaluation of alternative plans to determine to what degree each plan met the stated objectives. The following planning objectives address both problems specific to the study area and concerns of the overall planning effort.

- Contribute to growth of the commercial fishing fleet at the East Boat Basin during the 1983-2033 period of analysis.
- Contribute to growth of the recreational boating fleet at the East

Boat Basin during the 1983-2033 period of analysis.

- Contribute to the safety of navigation at the East Boat Basin by providing an adequate navigation system during the 1983-2033 period of analysis.
- Contribute to the socioeconomic development of the East Boat Basin and surrounding Cape Cod area during the 1983-2033 period of analysis.
- Contribute to the enhancement of environmental resources during the 1983-2033 period of analysis.

PLANNING CONSTRAINTS AND CONCERNS

Planning constraints are those parameters that may limit the scope of available solutions. These constraints in combination with other planning considerations, direct plan formulation and restrict adverse impacts. Planning constraints may include the physical features of the study area, technological states of art, economic limitations and legislative restrictions. Two planning constraints were identified through consultation with the town of Sandwich and examination of the study area.

The town of Sandwich has earmarked 22 acres of land adjacent to the East Boat Basin for the proposed expansion project. Besides this area,

the only other vacant land available for potential development is a parcel on the east side of Gallo Road just over 2 acres in size. Expansion of the basin into this area would not provide good basin geometry and would disrupt Gallo Road, which is the main access road for activities on the east side of the basin. The remaining surrounding area would not provide any opportunities for basin expansion, since major disruption of existing development would occur. Therefore, planning for expansion of the basin was limited to the town's property, which is consistent with the town's wishes.

A second planning constraint is that all of the previously mentioned town property would not be utilized entirely for navigation facilities. The local interests are proposing to fully develop the area around an expanded basin to include fish offloading and freezer facilities, marine service facilities, parking, rack storage for recreational boats and other related business. A substantial portion of the available land would be needed for this development, thereby limiting the size of basin expansion.

A number of other concerns were identified that may limit construction of an expansion project. The time of construction may have to be restricted to periods when less activity is taking place at the basin. When and where to dispose of project material will be subject to, and limited by, state and Federal environmental statutes. With the current state of the economy, potential economic constraints may surface that could adversely impact project implementation.

PLANS OF OTHERS

There are currently three plans of improvement under consideration by others in conjunction with the East Boat Basin. The Corps of Engineers is planning to rehabilitate/replace the deteriorating bulkhead along the Cape Cod Canal, and the town of Sandwich is considering assuming management of the entire basin, in addition to proposing expansion of the basin.

The Corps of Engineers is proposing to remove the entire existing bulkhead system, and replace it with a combination of rock slope protection and steel sheet pile bulkhead. About 700 feet of new bulkhead would be installed, 200 feet fronting Canal Marine, Inc., and a 500 foot section starting about 200 feet east of the basin entrance and extending eastward. The remaining 880 feet of existing bulkhead would be replaced with rock revetment. The 200 foot section will be used for fish offloading, and the 500 foot section will be used for fish offloading, maintenance operations and emergency berthing. The estimated cost of construction is \$3,620,000, and construction is anticipated to begin in fiscal year 1985 at the earliest. Implementation of this plan would require a reorganization of existing uses along the bulkhead. Fish offloading and other bulkhead operations would be consolidated along the new bulkhead, leaving the remaining area for recreation.

Also, implementation of this plan would change the east side of the

present basin entrance by replacing the existing bulkhead with riprap revetment, as shown on Figure 10. The construction timeframes of this plan relative to expanding the East Boat Basin is not known exactly; however, at this time construction of the bulkhead replacement plan first appears more probable. Construction impacts resulting from a basin expansion project were considered for both basin entrance possibilities.

A cooperative town of Sandwich/Corps of Engineers plan to maximize utilization of the existing basin is under consideration. This plan was previously discussed in the Condition If No Federal Action Is Taken section, and is shown on Figure 9 of that section. One hundred and two new slips would be constructed at an estimated cost of \$650,000 to \$700,000.

In April 1979 a study examining the feasibility of expanding the East Boat Basin was completed for the town of Sandwich. Results of the study indicated that expansion of the basin was economically feasible.

Two plans of improvement were developed, both of which involve physically expanding the basin with a landcut. Plan A is an open basin plan, meaning that one large landcut would encompass all anticipated activities. Plan B is a split-basin plan, meaning that two smaller landcuts are proposed, resulting in a central peninsula that would separate commercial fishing and recreational boating activities.

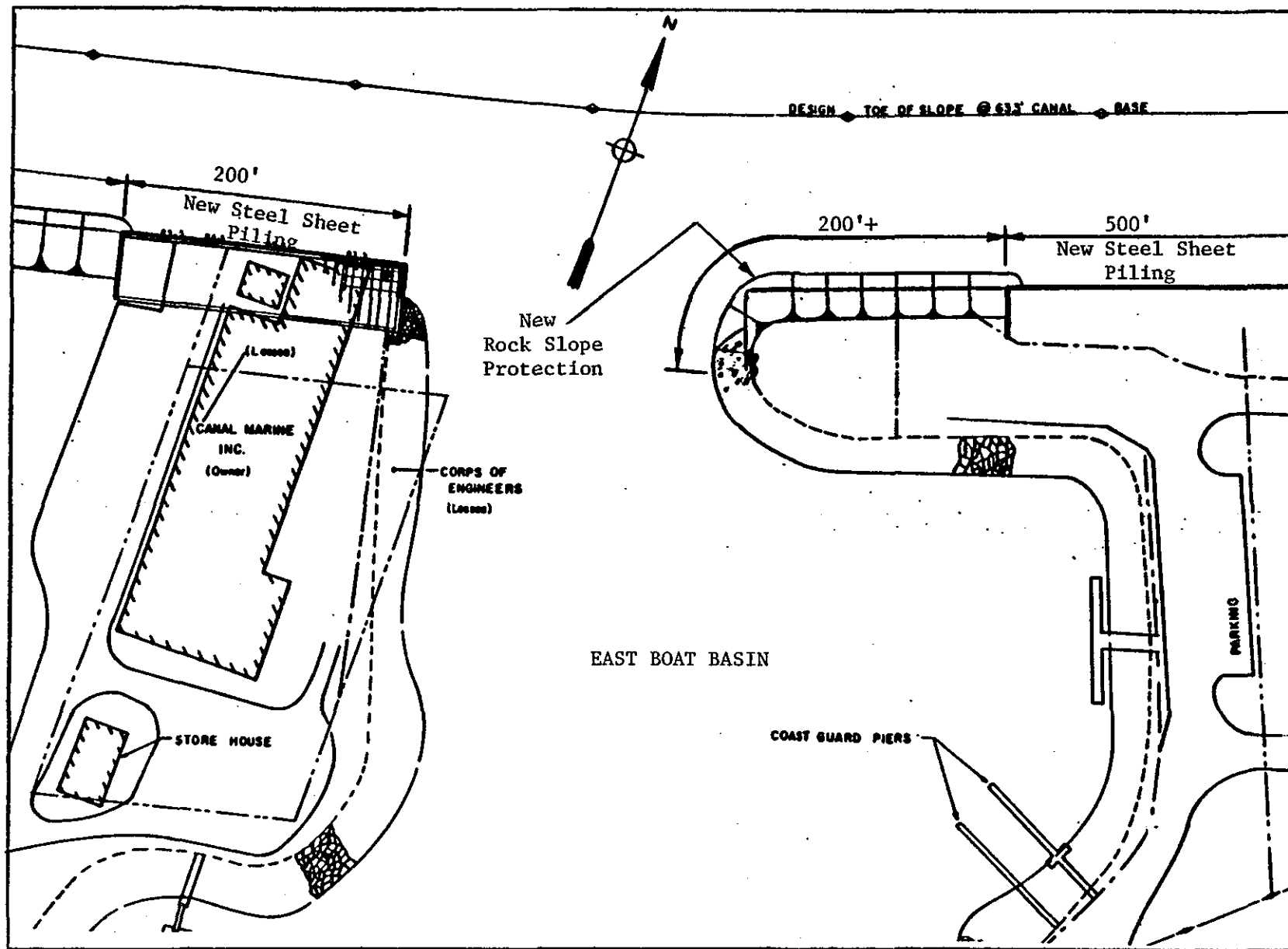


FIGURE 10 - BASIN ENTRANCE UNDER THE PROPOSED BULKHEAD REHABILITATION PLAN

The study considered the total development of the expanded East Boat Basin, including the water area expansion and landward facilities. However, cost estimates were developed for the basin expansion only. Both the open basin plan (Plan A) and the split basin plan (Plan B) utilized all slip berthing areas for wet storage of boats. Shore stabilization in both plans was composed entirely of steel sheet pile bulkheading. Depths of commercial areas and channels would be -16 feet MLW and depths in the recreational areas would be -8 feet MLW. Major line items for Plan A include \$4.5 million for bulk earth removal, \$1.4 million for docks and piers; \$2.3 million for bulkheads and \$0.8 million for tie back system. Major line items for Plan B include \$4.3 million for bulk earth removal, \$1.6 million for docks, \$3.5 million for bulkheading and \$1.1 million for tie back system. The total first cost estimates for both plans are \$16 million and \$18 million respectively. Costs are in 1979 dollars and the two plans are shown in Figures 11 and 12.

Estimated benefits are increased fish landing benefits of \$7,327,000 and increased recreational boater benefits of \$412,500, yielding total annual benefits of \$7,739,500. This results in a benefit/cost ratio of 5.6 to 1 when the annual benefits are compared with the first cost amortized over a project life of 50 years. The 5.6 figure was based on the first cost for Plan B, using a 6-7/8 percent discount rate.

PLAN FORMULATION RATIONALE

The plan formulation process was based on a logical sequence of steps leading to the formulation of plans and selection of a recommended plan. The process is summarized by the steps listed below.

1. Base studies were performed to establish existing conditions and identify the problems and needs of the study area.
2. Formulation and evaluation criteria were established.
3. Possible management measures were identified that would best address the problems and needs.
4. Projections of future activity were made to determine the degree of improvement necessary to meet present and future needs.
5. Planning objectives were established.
6. Planning constraints were identified.
7. Alternative plans were formulated based upon the information developed in items 1 through 6.
8. Several iterations of assessment, evaluation and reformulation, resulted in a set of detailed plans and the selection of a recommended plan.

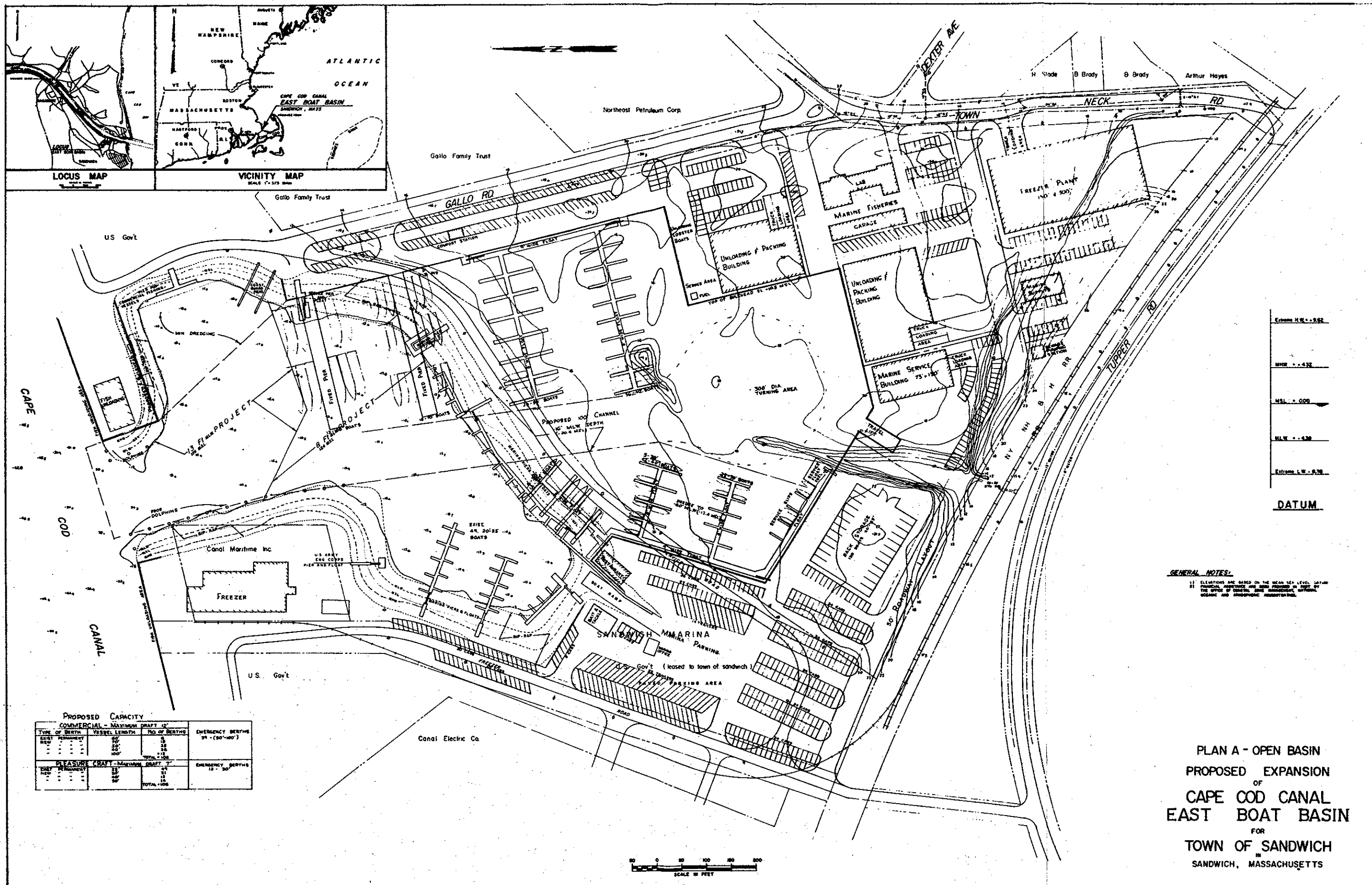


FIGURE 11

The detailed plan formulation is contained in Appendix 2, Formulation, Assessment and Evaluation of Plans.

ANALYSIS OF PLANS CONSIDERED IN PRELIMINARY PLANNING

A group of eight preliminary alternative plans were formulated and analyzed during the intermediate portion of the study. Major emphasis was on the analysis of plans involving excavation/dredging of a landcut to expand the existing basin. However, one plan, known as a primarily non-structural plan, did consider the possibility of increasing uses of the existing basin. The remaining alternative plans examined a range of sizes and various configurations to determine which plan provided the most desirable results. The eight preliminary alternatives are briefly described below.

Description of Plans

Each of the alternative plans included an entrance channel, a turning/maneuvering area, an offloading area for fishing boats, a commercial berthing area and a recreational berthing area. Depths were consistent for all plans as listed below.

Entrance channel - 14 feet below mean low water (MLW)

Turning/maneuvering area - 14 feet below MLW

Offloading area - 14 feet below MLW

Commercial berthing area - 12 feet below MLW

Recreational berthing area - 6 feet below MLW

The basin expansion perimeter would be stabilized and protected with riprap revetment for all plans. Steel sheet pile bulkheading would be used in areas where the offloading of fish would take place.

Alternative A - This alternative would provide an increase of 3.4 acres of water area, which is the least expansion of all the alternatives. The central entrance channel would separate the commercial berthing area from the recreational berthing area and would terminate at a turning/maneuvering area. This area would be adjacent to, and provide access to, fish offloading areas at the back of the basin.

Alternative B - This alternative would provide a rectangular expansion of 7.6 acres of water area extending parallel to Gallo Road. The entrance channel alignment and location of plan features with respect to each other would be similar to Alternative A.

Alternative C - The basin water area would increase by 8.8 acres under this alternative. Again, the channel alignment and location of plan features would be similar to Alternatives A and B. The east rear corner of the expansion would be inverted to provide space for placement of offloading facilities.

Alternative D - In Alternative D a different basin expansion configuration was considered. The fish offloading areas would be located in the center of the basin along the east side. The entrance channel follows the same alignment as previous plans, providing access to maneuvering/turning areas and berthing areas that are located further inside the basin. The increase in water area would be 9.3 acres.

Alternative E - Alternative E is exactly the same as Alternative B, except that the expanded basin extends farther back. The increase in water area would be 9.7 acres.

Alternative F - This alternative is similar to Alternative D in that the offloading areas are also located along the east side in the center of the basin. The entrance channel alignment swings adjacent to the offloading area, providing access to the commercial berthing area further into the basin and the adjacent recreational berthing area west of the channel. The increase in water area would be 10.1 acres.

Alternative G - This alternative examined an entirely different expansion configuration than all previous plans. A split-basin configuration which provides separate water areas for commercial fishing and recreational boating was considered. A peninsular land area would separate the two areas and would have marine service facilities located on it. The entrance channel would open up to a large maneuvering area which provides access to the two areas. The total increase in water area would

be 8 acres.

Alternative H - Alternative H examined the possibility of making the existing basin more usable. An entrance channel and turning/maneuvering area would be constructed to provide access to a bulkhead area at the back of the basin for fish offloading. A rack storage facility for recreational boats would also be incorporated into this alternative.

Comparative Assessment and Evaluation of Plans

Evaluation of the preliminary alternative plans determined that all plans were economically feasible. Computation of annual net benefits indicated that the larger plans generated substantially more benefit than smaller plans. The cost of alternatives also increase with size, so that a tradeoff exists between project cost and level of benefit generated.

The major environmental impact associated with the proposed project is the problem of material disposal. The disposal problem increases as project size increases, with the major impact being one of quantity. Environmental test results determined that material quality is good in terms of grain size and chemical content.

Socioeconomic impacts would also increase with increases in plan size: e.g., more jobs, more economic benefit to the town and more truck traffic through town, if a land disposal option is implemented. The

various basin configurations affected the location of plan features, thereby impacting future traffic patterns of the area. Some configurations may be more consistent with local desires than others. An impact that would pose problems in implementing smaller plans is the possibility of insufficient berthing space to relocate larger boats displaced due to construction of the expansion.

Conclusions

The assessment of impacts showed that the degree to which planning objectives are achieved depends on how much the basin is expanded. Larger plans address the planning objectives to a greater extent than smaller plans, except in the case of the environmental objective. More material must be disposed of for the larger plans; however, beneficial use of the material could greatly minimize adverse environmental impacts.

The screening of preliminary alternative plans was primarily based on economic criteria and input from local interests. Maximization of net benefits, which is consistent with National Economic Development (NED) policies, was used to quantify and measure the degree to which the first two planning objectives were met. Local interests provided input to assure that the study of detailed plans would be consistent with local desires.

Based on the above screening criteria alternatives B, D, E and F were

selected for further detailed evaluation, and were redesignated as Plans A, B, C and D.

ANALYSIS OF DETAILED PLANS

✓ The preliminary screening of alternatives concluded that a structural solution would be the most effective means of addressing the problems and needs of the area. Four structural plans (Plans A, B, C, and D) were carried forward from preliminary planning for detailed study, and are ✓ described, assessed, and evaluated in Appendix ²/₁.

The assessment and evaluation of detailed plans identified a range of general impacts that would be common to all of the alternatives. This section provides a summary of the general impacts, including dredging/excavation impacts, navigation impacts, environmental impacts, economic impacts and socioeconomic impacts.

Dredging/Excavation Impacts

Dredging/excavation impacts would vary mainly with the quantity of material to be removed, which would range from about 431,670 cubic yards to 597,840 cubic yards. The ranking of plans in order of quantity from least to greatest would be A, C, D, B. By far the largest percentage (93%-98%) of the project material would be generated by excavation of the landcut, with the remainder coming from dredging in the existing basin.

Project material would consist of mostly sand and gravel, with a lesser percentage of fine grained material. The quality of the material, particularly from the landcut, is well above that of sediments dredged from typical harbors in the region.

Navigation Impacts

Implementation of an expansion project would more than double the usable harbor area, with increases in water area ranging from about 7.8 acres to 9.9 acres. The inclusion of recreational and commercial berthing areas would allow increases in the size of each respective fleet, with larger increases going to the larger plans. Gains in the recreational fleet would range from about 1 to 53 boats in the expansion area, and the implementation of rack storage by local interests would further increase the fleet by at least 120 boats. The use of slips would be proposed for the recreational area, since open mooring would not provide growth of the recreational fleet for any plans. Gains in the commercial fleet would range from about 40 to 52 vessels with slips, and from about 17 to 22 vessels with open mooring.

An entrance channel and turning/maneuvering area would also be provided for safe and efficient two-way navigation within the expanded basin. Adequate width and depth dimensions would permit all anticipated vessels to transit the basin without delay, and would accommodate the expected increase in boating traffic. In addition, access to new fish

offloading opportunities would be incorporated into a project.

Some disruption of the existing basin fleet would take place, involving the relocation of slips and dislocation of some boats. The harbor management measure proposing separation of the recreational and commercial activities would displace some recreational boats. However, sufficient space for relocation of boats in the expansion area would be available, in addition to providing the previously stated gains in the recreational fleet. Existing commercial vessels would realize little impact.

Environmental Impacts

Environmental impacts would be similar for all plans, varying to some degree based on the quantity of project material and extent of expansion. Impacts would be both short-term and long-term.

During construction operations, there would be a temporary increase in air, noise, and water pollution. Fish and benthic habitat would be disrupted. At the ocean disposal site, impacts would include turbidity and possible release of small amounts of contaminants. Terrestrial habitat at the construction site, and adjacent to it, would be removed or disrupted.

Long-term impacts would provide some potential benefits, including

✓ tapping of contaminated material from other dredging projects at the disposal site, and the increase of fish and benthic habitat within the basin. Terrestrial habitat would be eliminated by a project. With increased activity in the basin, somewhat more degradation of basin water quality may take place.

The Environmental Assessment, in Appendix 1, provides a detailed account of potential environmental impacts for the selected plan. Impacts would be similar for the remaining plans, and the EA should be consulted for more information regarding environmental effects.

Economic Impacts

Economic impacts of the proposed project were evaluated by determining estimated costs and benefits. Cost estimates were based on consideration of construction costs, mobilization, contingencies, engineering, design, supervision, and administration. Benefit estimates were based on increased fish landings and the value of recreation increase that would result from each alternative.

Equivalent annual costs were compared to projected annual benefits to determine the benefit to cost ratio (BCR). A BCR of 1 or greater indicates economic feasibility. Net annual benefits (annual benefits minus annual costs) were determined to provide a measure of the total benefit that would result from a project. BCR's ranged from 2.9 to 3.9

for slip berthing, and from 1.2 to 2.2 for open mooring. Benefits under open mooring would be substantially less because of the smaller number of fishing vessels that could be accommodated. Net annual benefits ranged from \$2,986,400 to \$4,026,900 for slip berthing and from \$1,376,700 to \$2,131,700 for open mooring. Plan C had both the highest BCR and annual net benefits, under the slip berthing condition.

✓ The apportionment of project costs between the Federal Government and local interests ^S is a major consideration in project implementation.

✓ Several cost-sharing scenarios could be applicable, including cost-sharing proposed by the ^A administration, traditional cost-sharing and cost-sharing based on precedent. Since actual cost-sharing of the project is uncertain until project implementation, only comparison of the traditional cost-sharing impacts is summarized here.

✓ The alternatives generally would have similar cost-share breakdowns, varying somewhat due to the different sizes of project features. Cost-sharing under the slip condition would range from 11.9 to 22.9 percent Federal and 77.1 to 88.1 percent local, whereas under the open mooring condition cost-sharing would range from 43.1 to 49.0 percent Federal and 51.0 to 56.9 percent local. The difference in cost-sharing between the two conditions is due to cost-sharing policies that preclude Federal participation in construction of berthing areas ^{and other project features}. A tradeoff exists between cost-sharing and benefits in the decision to implement slips in the commercial berthing area. However, measurement of plans against the

Net Economic Development (NED) criteria determined that open mooring would
✓ be less desirable. It should be noted that the percent ranges discussed^d
above do not include the cost of slips, which would be an additional cost
✓ to local interests.~~76~~

Socioeconomic Impacts

The discussion concerning socioeconomic impacts is also applicable to all of the detailed plans. Impacts would occur both during construction and after construction.

The major impacts during construction would involve the disruption of existing activities within the basin, along the bulkhead and in the general vicinity. Recreational boats and commercial vessels may be temporarily dislocated from the East Boat Basin, and recreational activities in the area may be curtailed. Disposal of project material
✓ could affect ~~areas~~^{activities} along the bulkhead if loading barges is deemed more desirable at this location. Onland; traffic in and around the basin would be impacted and it may be necessary to reroute or curtail traffic. In
✓ general, the incre^{se} in dust and noise may be disruptive to businesses, residents and visitors in the area.

After construction of the basin expansion and development of the surrounding area by local interests, the increases in the fleets will bring new benefits to the area. The town of Sandwich and the region would

realize additional income in jobs and taxes. Navigation activities would operate at a safer and more organized manner than at present. There would be increased recreational opportunities, including recreational boating and the experience of observing operations at a new aesthetically pleasing harbor. The major difference between detailed plans would be how each configuration affects the location of onland development, and future traffic patterns. Socioeconomic impacts are further discussed in Appendix 3.

Conclusions

The assessment and evaluation of detailed plans resulted in the selection of a recommended plan of improvement. Since project impacts would be similar in scope for all of the detailed plans, the selection of the recommended plan was primarily based on the NED criteria. Plan C was selected as the recommended plan, and is therefore discussed in detail in sections that follow.

COORDINATION

Public involvement was an important aspect in performance of the study. It was accomplished through field visits, meetings, workshops, mailings, distribution of reports and telephone communications. Various levels of coordination were maintained with the following publics throughout the course of the study.

Federal Agencies

1. U.S. Fish and Wildlife Service
2. National Marine Fisheries Service
3. Environmental Protection Agency
4. U.S. Coast Guard
5. U.S. Air Force
6. U.S. Army
7. Corps of Engineers

State Agencies

- ✓ 1. Executive Office of Environmental Affairs
2. Coastal Zone Management
3. Division of Marine Fisheries
4. Metropolitan District Commission
5. Department of Environmental Quality Engineering
6. Wetlands Protection Division
7. Division of Water Pollution Control

Local Interests

1. Town of Sandwich
2. Sandwich Harbormaster

3. Town Engineer
4. fish house operators
5. fishermen
6. Sandwich Marina Committee
7. private individuals

✓ The public involvement program began with a public announcement for the initiation of a navigation study at the East Boat Basin. Early meetings with local interests and reponse to the public announcement set forth the problems and needs of the study area. Sufficient information concerning the type of improvements desired was also obtained, from which a preliminary plan was formulated and evaluated. Reports summarizing the first study iteration were then distributed to interested parties.

✓ Extensive field work was performed to establish the base conditions in more detail, and to obtain input for the formulation of alternative plans. Resource agencies and local interests were consulted concerning the future conditions of an expanded East Boat Basin. Resource agencies assisted in determining marine resource projections, which established the level of future fishing industry tht could be supported. Fish offloaders and fishermen provided information on the types and sizes of vessels expected, and types of navigation facilities needed. The harbormaster provided valuable information on the potential growth of recreational boating. The information was utilized to project future conditions at the basin from which alternative plans were formulated.

✓ A second major public ⁿinput was in the formulation of strategy for disposal of dredged and excavated material. The town of Sandwich, resource agencies, and area towns were coordinated with to assist in identifying and evaluating disposal options.

A final broad based public review will provide the opportunity for many interested publics to comment on the proposed project, thereby identifying any points of concern that may require clarification.

Correspondence accomplished during the study, and public comments to be received after public review of the draft report are contained in Appendix 4, Public Views and Comments.

THE SELECTED PLAN

The culmination of the plan formulation process resulted in the selection of a recommended plan of improvement, hereafter referred to as the selected plan. Plan C is the selected plan since it provides the maximum net benefits of the four plans studied in detail. The following sections describe the various aspects regarding implementation of Plan C.

DESCRIPTION

Plan C would expand the existing East Boat Basin by a total of 12.0 acres, comprised of 9.9 acres of water area and 2.1 acres of riprap slope area. The water area would consist of a 120-foot wide entrance channel, 14 feet deep by 1220 feet long; a 4.5 acre commercial berthing area, 12 feet deep; a 1.8 acre recreational berthing area, 8 feet deep; a 450-foot by 160-foot turning/maneuvering area, 14 feet deep; and a 670-foot by 30-foot offloading area, 14 feet deep. The riprap slope protection would be constructed at a 2 horizontal to 1 vertical slope, with appropriate toe protection, to the bottom elevation of adjacent water areas. The use of bulkhead is proposed in and around anticipated offloading areas. Top elevations for riprap and bulkhead would be established at 11 feet National Geodetic Vertical Datum (NGVD), equivalent to ^{about} 15 feet mean low water (MLW), which would provide protection to the 100-year flood elevation. Figure 13 illustrates the selected plan as compared to the without-project condition.

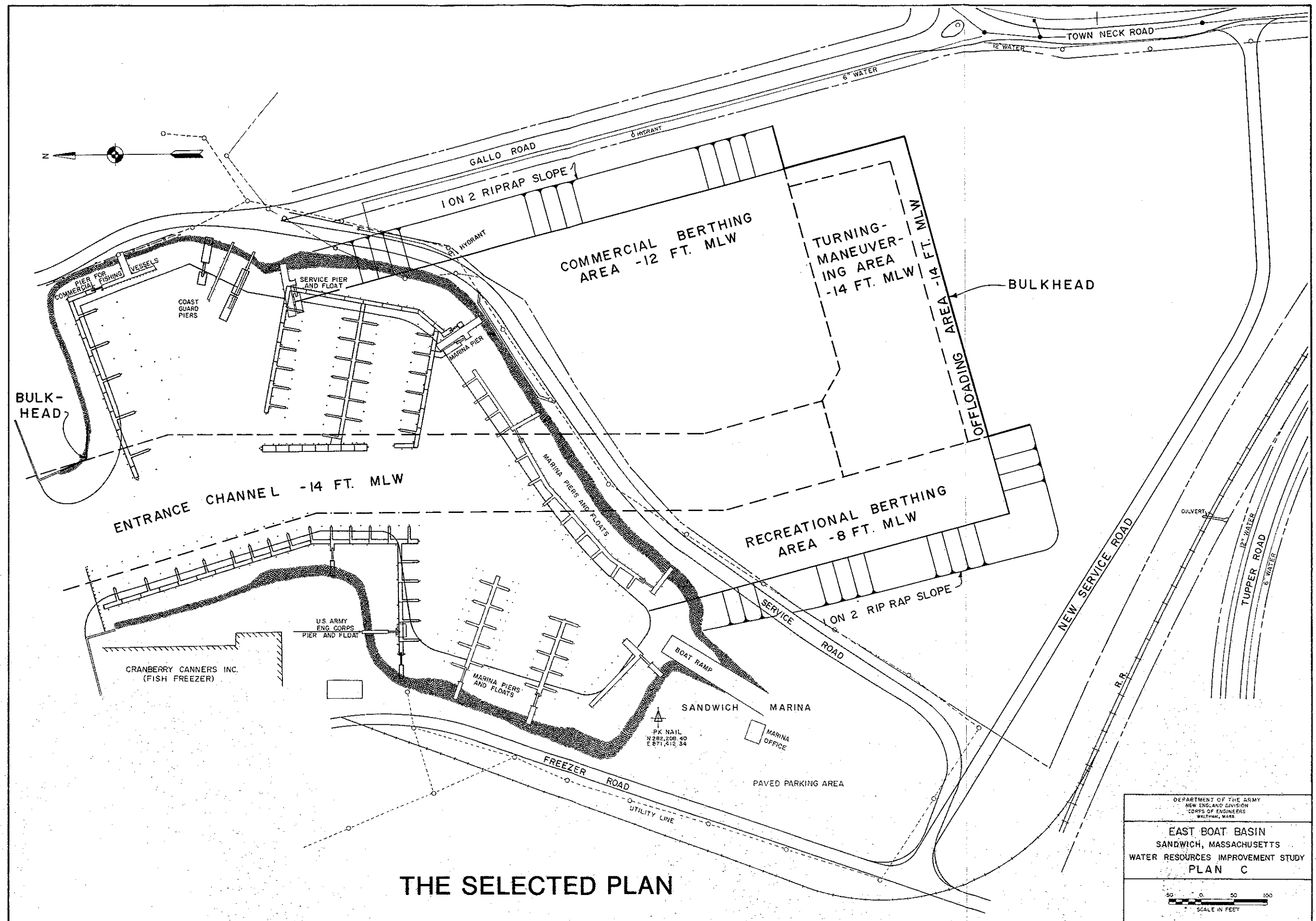


FIGURE 13

The entrance channel is proposed to have a 180-foot width at the
✓ basin entrance to enhance safety of navigation ^{in this area}. The channel line would be
superimposed on the existing bulkhead, and with placement of additional
bulkheading, material would be removed to provide the necessary channel
✓ width without impacting ^{a nearby} existing structure.

The existing basin would be expanded by excavating a rectangular
landcut southward into the property owned by the town of Sandwich. About
^{excavated from the landcut, and about 28,510 cubic yards of}
504,920 cubic yards of material would be dredged from the existing basin ^{material}
for a total of 533,430 cubic yards. ^{would be}

Construction of the project would most likely take place in two
phases, an excavation phase and a dredging phase. Excavation of the
interior portion of the expansion would take place south of the service
road, which would serve as a dike structure. Dewatering pumps would
enable the excavation work to continue in the dry to the extent possible.
Project material would be transferred to scows located either in the basin
or along the canal, for dumping at the Foul Area 45 miles away. A
✓ location map (Figure 3) is contained in the Environmental Assessment,
Appendix 1.

Bulkhead would be driven during the excavation phase, and if boulders
resist driving in some places, excavation and backfilling for the bulkhead
✓ may be required. Stone protection would be placed ^{randomly} to project depth
✓ ~~randomly~~ and then dressed as needed. Upon completion of the interior

portion of the expansion, water would be permitted in the expansion to equalize water pressures. The dike structure would then be excavated as much as possible.

✓ The dredging phase would include dredging of the existing basin material and removing the remaining portion of the dike using a bucket type dredge. In addition, the entire expansion would be surveyed and material removed to project depth (including any overdepth).

The dredged material would be directly loaded into scows for transport to the dump site. Transition slopes between navigation features were assumed to stabilize at 3 horizontal to 1 vertical. The remaining stone protection would then be placed. It was roughly estimated that construction would require about 2 years.

COSTS

The project first cost was estimated at \$9,537,000 in February 1983 dollars. Table 17 below summarizes the cost for each project component and the total cost of the navigation project.

✓ ^{able}
~~TABLE~~ 17

Total Project Cost - The Selected Plan

<u>Project Component</u>	<u>Cost</u>
Entrance Channel	\$ 946,000
Turning/Maneuvering Area	949,000
Commercial Berthing Area	1,835,000
✓ Recreational Berthing Area	⁶⁸⁰ 68 ,000
Offloading Area	218,000
Bulkhead	2,262,000
Upland Costs	81,000
✓ Subtotal	<u>\$6,971,000</u>
✓ Contingencies	1,394,000
✓ Subtotal	<u>\$8,365,000</u>
Engineering and Design	586,000
Supervision and Administration	<u>586,000</u>
Total	\$9,537,000

In order to generate the level of benefit attributable to Plan C, slips would be implemented in the commercial berthing area. The cost of
 ✓ slips was roughly estimated for incorporation into the economics equation. Table 18 summarizes slip costs for Plan C.

Table 18

Slip Costs - The Selected Plan

<u>Item</u>	<u>Cost</u>
-------------	-------------

Recreational Slips	\$ 469,000
Commercial Slips	<u>636,000</u>
Subtotal	\$1,105,000
Contingencies (20%)	<u>221,000</u>
Subtotal	\$1,326,000
Engineering and Design (7%)	93,000
Supervision and Administration (7%)	<u>93,000</u>
Total	\$1,512,000

PROJECT ACCOMPLISHMENTS

The project would accomplish an increase in harbor area that would provide the opportunity for growth of the recreational boating and commercial fishing activities. Additional berthing area would permit an 11 percent (15 boats) increase in the recreational boating fleet, and a 130 percent (52 vessel) increase in the commercial fishing fleet.

The project would provide a 120-foot wide channel, which would accomplish improvements in the level of navigation safety and efficiency. The turning/maneuvering area would provide sufficient space in the working portion of the harbor to permit safe and efficient maneuvering of vessels during offloading operations.

In addition to accomplishing specific project objectives, the project

would encourage development of the surrounding area by local interests. This development would contribute to the increase in economic prosperity of the area by providing jobs and increasing revenues to the town.

- ✓ Regionally, the East Boat Basin would provide much needed facilities for the commercial fishing industry. The opportunity exists for it to become the
- ✓ premier fishing port on Cape Cod.

PROJECT EFFECTS

Implementation of the selected plan would produce environmental, social and economic effects. Rather than reiterating environmental and social effects here, they have been discussed in detail in Appendices 1 and 3, respectively. However, Table 19^x, which displays effects of the selected plan on resources of national recognition is contained herein. A discussion of the economic effects is contained in the following section.

re
ble 19
here →

ECONOMIC EVALUATION

✓ The total project investment cost, including slip costs, and economic costs for land and interest during construction (IDC), was amortized over a 50-year project life. The discount rate currently applicable to federal projects is 7.875 percent annually, resulting in an amortization rate of .0806. The equivalent annual charge is \$1,008,000 for the selected plan.

Historically, maintenance of the existing basin has been minimal. A

✓ nominal annual maintenance charge of \$18,000 was developed, and includes maintenance dredging, riprap ^{P. 1-2} replacement and maintenance of aids to navigation. The total annual charge is \$1,026,000.

✓ Annual benefits were determined based on the value of new fish landings, and the value of recreational ~~at~~ to new recreational boaters and charterboat fishermen. The annual value of these three benefit categories are \$3,771,000, \$62,000 and \$194,000, respectively, for a total of \$4,027,000. Net annual benefits indicates the value of benefit that would accrue after the investment costs have been accounted for. The economic parameters for the selected plan are summarized below.

<u>Annual Costs</u>	<u>Annual Benefits</u>	<u>BCR</u>	<u>Net Benefits</u>
\$1,026,000	\$4,027,000	3.9	\$3,001,000

Table 19

Effects of the Selected Plan on Resources of
Principal National Recognition

Principal Sources of

<u>Types of Resources</u>	<u>National Recognition</u>	<u>Measurement of Effects</u>
Air Quality	Clean Air Act, as	No Effect

*move Table 19
to Project Effects
section*

amended. (41 U.S.C.

1875h-7 et seq.)

✓ Areas of Particular ^{Concern} _A Within the Coastal Zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.)	No Significant Concern
Endangered and Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	No Effect
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec 661 et seq.)	An increase in fish habitat comprising an area of 9.9 acres. Wildlife habitat would decrease by 12.0 acres.
Floodplains	Executive Order 11988, Floodplain Management	No Effect
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec 470 et seq.)	No Effect

Prime and Unique
Farmland

CEQ Memorandum of August No Effect
1, 1980: Analysis of
Impacts on Prime or
Unique Agricultural
Lands in Implementing
the National Environmental
Policy Act.

✓
Water Quality

Clean Water Act of 1977 No Effect
(33 U.S.C. 1251 et seq.) (No change in water
quality rating.)

Wetlands

Executive Order 11990, No Effect
Protection of Wetlands
Clean Water Act of 1977,
(42 U.S.C. 1857h-7, et
seq.)

✓
Wild and Scenic
Rivers

Wild and Scenic Rivers No Effect
Act, as amended (16
U.S.C. 1271 et seq.)

COST ALLOCATION

The purpose of cost allocation is to provide an equitable

distribution of project costs among project purposes in a multiple-use project. The proposed expansion project includes both specific purpose project features and multiple purpose project features. The cost of specific purpose features is entirely attributable to the specific purpose, whereas the cost of multiple purpose features is allocated to two or more purposes. The entrance channel and turning/maneuvering area are considered multiple purpose, since they are open to general navigation.

✓ Costs for these two project features were allocated based on the excess annual benefits remaining after accounting for the annual cost of each specific project feature. The benefits from which the annual costs were subtracted, are based on the fleets expected to use the specific project features. The costs of the multiple purpose features were then allocated based on the proportion of specific purpose excess benefits to total excess benefits.

✓ Only the material removal portion of the entrance channel was applicable to cost allocation, since ~~the Federal government could not~~ *the Federal government could not participate in construction of* the bulkhead proposed for the basin which entrance would be a local cost. The cost of bulkhead was reflected in the cost allocation percentages for the entrance channel, since it is considered part of the construction necessary for the entrance channel.

Allocation of multiple purpose costs is summarized in Table 20. All remaining project features address a single purpose and would not require cost allocation.

Table 20

Allocation of Multiple Purpose Costs

<u>Item</u>	<u>Purpose (%)</u>	
	<u>Recreation</u>	<u>Commercial</u>
Entrance channel		
✓ Material removal (70.1%)	<i>leave as is</i> 2.5 4.8	68.3 68.3
✓ Bulkhead (29.9%)	-	-
Turning/maneuvering area	2.5	97.5

The allocation of multiple purpose project feature costs is important because project cost-sharing is affected. For example, under traditional cost-sharing policies commercial navigation is 100% Federal/0% local, and recreational boating is 50% Federal/50% local. If the turning/maneuvering area is considered for cost-sharing; then 100 percent of the 97.5 percent commercial purpose is Federally cost-shared, and 50 percent of the 2.5 percent recreational purpose is Federal cost-shared, for a final cost-share of 98.75% Federal/1.25% local. The entrance channel cost-share was determined in the same way.

COST APPORTIONMENT

This section describes the various project cost-sharing scenarios

that could be applied to the selected plan. Cost-sharing of water resource projects at this time is highly uncertain, and a case by case consideration of projects appears to be the present approach. The three cost-sharing scenarios discussed include the encouragement of innovative cost-sharing by the administration, traditional cost-sharing policies and cost-sharing based on existing authority.

Innovative Cost-Sharing

✓ The general thrust of innovative cost-sharing is the requirement to have local interests assume a greater responsibility in financing Federal navigation projects. At the present time, a number of cost-sharing proposals are being considered by the Congress. However, no specific cost-sharing guidance is available to determine ~~a~~^{specific} definitive cost-sharing breakdown under the innovative cost-sharing scenario. Therefore, until such time as a cost-sharing proposal acceptable to both the Congress and the Administration is passed, cost-sharing of navigation projects will depend upon the reaching of an innovative financing plan that is agreeable to both local interests and the Federal Government.

The latest proposal developed by the Department of the Army, on behalf of the Administration, for new Federal project construction starts would provide full recovery of certain construction, operation, and maintenance costs. Costs allocated to commercial navigation purposes would require 100 percent cost recovery. Local interests would be

required to finance 75 percent of the Federal project up-front, with the remaining 25 percent reimbursed over ⁴²~~the~~ 50-year project life. Costs allocated to recreation purposes would remain the same as traditional cost-sharing, with 50 percent up-front from local interests and 50 percent up-front from the Federal Government. Local interests would be responsible for reimbursing all subsequent operation and maintenance costs.

The interest rate for reimbursement purposes would be determined by the Secretary of the Treasury based on the average market yields on outstanding obligations of the United States. Reimbursements for operation and maintenance would be made annually, and may be scheduled and adjusted to reflect the actual operation and maintenance costs. The non-Federal body would be authorized to recover its reimbursement obligations pursuant to these requirements through the collection of user fees from commercial vessels.

~~There are a number of cost-sharing bills under consideration by Congress, with a variety of compromise proposals. However, until such a bill is passed, uncertainty as to final cost-sharing for a project will remain. At the present time, potential implementation and cost-sharing of a proposal is weighed by its economic desirability and the degree of local support (including financial support) that can be garnered for it.~~

Traditional Cost-Sharing

The selected plan as cost-shared under traditional policies, would be

22.9 percent Federal and 77.1 percent non-Federal. The cost-sharing breakdown reflects the cost of the navigation project only, and not the cost of slips. Local interests would be required to finance the additional cost for slips.

Existing Authority Cost-Sharing

The selected plan as cost-shared based on existing authority, would
✓ be 27.⁷₈ percent Federal and 72.³₁ percent non-Federal. This breakdown
✓ indicates that the Federal government would contribute ^{4.8 percent} more under this scenario.

In effect, half the cost of constructing the recreational berthing area (not including slips) would be Federally funded, rather than not
✓ funded as would be ^{under} the traditional method. The reason for this is that the existing authority (House Document 168, 1963 expansion of the basin) recommended marina type slips in the recreational Federal project. A precedent regarding Federal cost-sharing of recreational berthing areas at the East Boat Basin may have been set, and could be applicable to the expansion recreational berthing area. A final determination will have to
✓ be made by higher authority concerning this matter.

PLAN IMPLEMENTATION

This section of the report describes the process that leads to project construction. Discussions of implementation considerations, items of local ^{responsibility} ~~cooperation~~, items of Federal ^{responsibility} ~~cooperation~~ and the post-study authorization process are included.

IMPLEMENTATION CONSIDERATIONS

A number of general implementation concerns are discussed herein for further clarification regarding potential implementation of the proposed project.

✓ This study investigated the overall feasibility of a navigation expansion project at the East Boat Basin, in addition to considering potential upland development by local interests. Studies determined that the use of slips in both the recreational and commercial area was more desirable, from both an economic viewpoint and a practical viewpoint. Plan C, the selected plan, proposes the use of slips in these areas. Based on policies regarding Federal participation in projects, the recreational and commercial berthing areas would not be considered as part of the Federal project, along with the offloading area, bulkheading and upland costs. The Federal project, then, would consist only of the entrance channel and the turning/maneuvering area. Whereas the cost of the entire navigation project would be \$9,537,000, with traditional cost-

✓ sharing of 22.9 percent Federal and 77.1 percent non-Federal; the cost of
✓ the Federal project would be \$2,592,000, with traditional cost-sharing of
84.5 percent Federal and 15.5 non-Federal. Most of the 15.5 percent non-
Federal share is attributable to the basin entrance bulkhead, which would
be a local expense necessary to implement the Federal project. Virtually
all of the material removal for the Federal project would be at Federal
expense, under traditional cost-sharing.

Since the berthing areas, offloading area and bulkhead would not be
considered as part of the Federal project, local interests would be
responsible for implementing them. In effect, the study provides a
conceptual plan for a basin expansion project which could be modified by
local interests, subject to meeting of local assurances. Local interests
would be responsible for final planning, engineering and construction of
the non-Federal project features and related facilities.

Maintenance of the Federal project would be a Federal responsibility,
and would include maintenance dredging and maintenance of aids to
navigation. Local interests would be responsible for maintenance of non-
Federal project features, including an \$37,000, with traditional cost-
sharing of 22.9 percent Federal and 77.1 percent non-Federal; the cost of
the Federal project would be \$2,592,000, with traditional cost-sharing of
84.5 percent Federal and 15.5 non-Federal. Most of the 15.5 percent non-
Federal share is attributable to the basin entrance bulkhead, which would
be a local expense necessary to implement the Federal project. Virtually

all of the material removal for the Federal project would be at Federal expense, under traditional cost-sharing.

Since the berthing areas, offloading area and bulkhead would not be considered as part of the Federal project, local interests would be responsible for implementing them. In effect, the study provides a conceptual plan for a basin expansion project which could be modified by local interests, subject to meeting of local assurances. Local interests would be responsible for final planning, engineering and construction of the non-Federal project features and related facilities.

Maintenance of the Federal project would be a Federal responsibility, and would include maintenance dredging and maintenance of aids to navigation. Local interests would be responsible for maintenance of non-Federal project features, including any maintenance dredging and riprap slope maintenance. Existing basin areas not affected by the expansion project, would continue to be maintained under existing authorities.

In addition to the navigation project, local interests would begin development of the surrounding area concurrently with the navigation project, or soon thereafter. This would include lowering of the surrounding grade, and as a minimum, the construction of fish offloading facilities and minimal recreational boating facilities. However, local interests envision much greater development including many marine-related businesses, which would ^{expand} ~~increase~~ the scope to a multi-million dollar

harbor development project. The Federal contribution of just over \$2 million for the navigation project would represent a small percentage of the financing required for the overall project.

✓ It should be noted that during the timeframe between study completion and project implementation things could change, primarily in regards to the disposal of project material. The Commonwealth of Massachusetts is presently performing studies of Cape Cod Bay to determine where to locate a designated regional disposal site for clean dredged material. Should a site be designated prior ~~to potential~~ ^{INSERT} upland uses, e.g., beach nourishment, may surface during this timeframe. Although on the whole the project material grain size is not satisfactory for beach fill, there may be layers of material suitable for nourishment of Town Neck Beach in Sandwich. The town of Sandwich may also identify other uses, since it will need to remove at least several hundred cubic yards of material generated from lowering the grade around the basin and would have to dispose of it.

ITEMS OF LOCAL RESPONSIBILITY

✓ In order to ²implement Federal project, necessary local sponsorship must be obtained. Local sponsors of the project must determine if the following assurances can be met.

The specific local requirements as contained in the Rivers and

INSERT

implementation, disposal of project material in Cape Cod Bay is highly likely. Project material should qualify because of its cleanliness, and the distance for disposal would probably be halved, resulting in a lower project cost.

Also, potential

Harbors Act are as follows:

1. Provide a cash contribution toward construction costs, determined in accordance with existing policies for regularly authorized projects. For projects addressing recreational boating purposes a 50 percent first cost contribution is required.

2. Provide, maintain and operate without cost to the United States, an adequate public landing with provisions for sale of motor fuel, lubricants and potable water open and available to the use of all on equal terms.

3. Provide without cost to the United States all necessary lands, easements and right-of-way required for construction and subsequent maintenance of the project including suitable dredged material disposal areas with retaining dikes, bulkheads and embankments therefor.

✓ 4. Hold and save the United States free from damages that may result from construction and maintenance of the project, except where such damages are due to the fault or negligence of the United States or its contractors.

5. Accomplish without cost to the United States alterations and relocations as required in sewer, water supply, drainage and other utility facilities.

6. Provide and maintain berths, floats, piers and similar marine facilities as needed for transient and local vessels as well as necessary access roads, parking areas and other needed public use shore facilities open and available to all on equal terms. Only minimum basic facilities or service as required as part of the project. Any service provided over the required minimum is a local decision, and financing of such facilities and services is a local responsibility.

7. Establish regulations prohibiting the discharge of untreated sewage, garbage, and other pollutants in the waters of the harbor users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and local authorities responsible for pollution prevention and control.

In addition to the above specific local responsibilities, local interests would have to assure the establishment of the projected recreational boating and commercial fishing activities within an expanded East Boat Basin. The economic feasibility of the expansion project, and thus the Federal project, is contingent upon increased benefits. Local interests would be required to provide the necessary berthing facilities to accommodate projected fleet increases. Also, fish offloading opportunities should be provided within the expanded basin to permit landing of anticipated increases in fish catch. Further development of the Sandwich fishing industry is congruent with the town's plans for this area, and town officials have had discussions with parties interested in

establishing commercial fishing related businesses. Implementation of these measures by local interests will insure the project expectations will be met.

The East Boat Basin is well known for being a desirable port of call for transient recreational craft. An average of 30 transients layover at the basin during summer periods. Local interests should consider retaining sufficient space for a minimum of 30 transients, in order to service the needs of the transient fleet.

ITEMS OF FEDERAL RESPONSIBILITY

The Federal project consists of constructing the entrance channel and the turning/maneuvering area only. The specific Federal requirements for participation in the project are delineated below.

1. Provide a cash contribution of 100 percent of construction costs of a Federal project, for the development of commercial activities. The commercial area must have access and be open for use by all on an equal basis.

2. Provide a cash contribution of 50 percent of construction costs of a Federal project, which enhances recreational activities.

3. Federal projects enhancing commercial or recreational activities,

will have the associated annual maintenance done or paid for by the
Federal government.

POST-STUDY IMPLEMENTATION PROCESS

The steps necessary for the plan of improvement to materialize are generally summarized as follows.

Upon completion of the draft Feasibility Report and Environmental Assessment, the Division Engineer releases a public announcement to initiate the public review phase. Draft reports are distributed to Federal, State and local interests for comment. Comments received from public interests during the prescribed review period are addressed, and incorporated into the final Feasibility Report and Environmental Assessment.

The Division Engineer issues a public notice announcing the study recommendations and sends the report to the Board of Engineers for Rivers and Harbors. The board reviews the report and comments in response to the notice and sends its recommendations to the Chief of Engineers who solicits formal review and comment by the Governor and interested Federal and State agencies.

Following the State and interagency review and after receipt of comments of the Office of Management and Budget regarding the relationship of the project to the program of the President, the final report of the Chief of Engineers will be forwarded by the Secretary of the Army to the Congress.

If all reviews find the project to be favorable, Congressional authorization of the proposed project will be required and the report will be submitted to the appropriate Congressional committee for consideration. Congressional procedure normally includes review and hearings by the Public Works Committees and authorization by inclusion in a Water Resources Development Act. Presidential approval of this act concludes the authorizing actions.

When Congress appropriates the necessary funds, detailed engineering and design will begin. Plans, specifications, and detailed estimates will be completed prior to advertising for bids and awarding a construction contract.

Once the construction funds are appropriated, local interests will be called upon to satisfy the requirements of local cooperation, including execution of a contract stating the local cooperation requirements and their legal and financial capability to provide them. After all necessary lands have been furnished, relocations completed and any necessary cash contributions furnished, a construction contract will be awarded and the project will be carried to completion.

VIEWS AND COMMENTS

Public views obtained during the study coordination process are contained in Appendix 4, in the Study Correspondence section. Public

comments received after the public review phase of the draft Feasibility Report and Environmental Assessment, and responses to the comments, will be incorporated into the final report in the Public Review Comments and Responses section.

CONCLUSIONS

The proposed expansion of the existing East Boat Basin was found to be economically feasible, based on the commercial fishing and recreational boating benefits expected to accrue as a result of the project. Increased commercial fishing benefits would constitute the bulk of projected benefits.

✓ Plan C, under the all slip berthing condition, would generate the greatest net benefit and therefore is the selected plan. It was concluded that slips would be necessary in the recreational ^{area} ~~fleet~~. In the commercial area, the use of slips would not be a prerequisite for economic feasibility. However, it was found that slips would maximize net benefits and therefore should be implemented in the commercial area also. Berthing of commercial vessels and recreational boats, plus the implementation of dry storage by local interests, would substantially achieve the planning objectives.

✓ The implementation of slips in the berthing areas would impact the delineation of the Federal project, and subsequently, project cost-

- ✓ sharing. Slips in the berthing areas would preclude these areas as part of
- ✓ the Federal project, which would consist of the entrance channel and turning/maneuvering area only. Local interests would therefore be responsible for implementation of all remaining non-Federal project features.

Environmental impacts from the project are expected to be minimal, based on the quality of project material and the relatively small amount of wildlife habitat that would be affected. Positive environmental effects may result at the project site and disposal site, further minimizing impacts.

Recommendations

*all
copy*

- As Division Engineer of the New England Division, Corps of Engineers,
- ✓ I have reviewed and evaluated ~~in~~ the overall public interest all pertinent data concerning the proposed expansion of the East Boat Basin. I have considered the views of other interested agencies, local interests and concerned public during the performance of this study. The possible consequences of constructing the selected plan as well as each of the alternatives were studied for environmental, social and economic effects, and engineering feasibility.

Accordingly, I recommend that the existing project for recreational boating and commercial fishing at the East Boat Basin in Sandwich,

Massachusetts, originally constructed under authority provided for the widening of the Cape Cod Canal, and most recently modified in 1963 under authority of resolutions adopted by the committees on Public Works of the United States Senate and the House of Representatives dated March 12, 1949 and July 6, 1949, respectively, be modified through implementation of a Federal navigation project in accordance with the plan selected herein.

✓ Further modification of the selected plan may be made at the discretion of
✓ the Chief of Engineers as may be advisable. The total first cost of the Federal project is presently estimated at \$2,592,000, with negligible operation and maintenance costs expected.

This recommendation is made subject to compliance with items of local responsibility by local interests as stated in the Plan Implementation section, and to cost-sharing and financing arrangements that are satisfactory to the President and the Congress.

Carl B. Siple
Colonel, Corps of Engineers
Division Engineer

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT
AND
ENVIRONMENTAL ASSESSMENT

APPENDIX 1
ENVIRONMENTAL ASSESSMENT

Prepared by the
New England Division, Corps of Engineers
Department of the Army

~~Revised~~ ✓
~~For Review~~
~~6-8-83~~

ENVIRONMENTAL ASSESSMENT

AND

FINDING OF NO SIGNIFICANT IMPACT

EAST BOAT BASIN

CAPE COD CANAL

SANDWICH, MASSACHUSETTS

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASSACHUSETTS

AUGUST 1983

*etc note: this
was not
printed out
the 2nd
time around*

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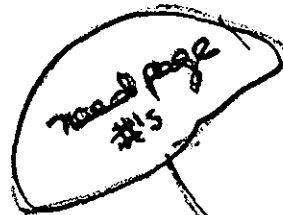
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I. Introduction

This environmental assessment identifies and addresses potential impacts on the environment, both adverse and beneficial, that would be attributable to the proposed navigation improvement project at the East Boat Basin in ~~Sn~~idwich, Massachusetts, and evaluates alternatives to this proposed action.

Local interests have recognized that existing conditions at the basin do not meet present and future needs of the commercial fishing, and recreational boating activities in the area. Therefore, they have proposed expansion of the basin to provide the additional facilities necessary to address present problems and to foster new growth of marine-related activities. ~~At~~ a first step towards realization of a basin expansion project, local interests requested that the Federal Government determine if it could participate in such a project. The request resulted in a Congressional resolution authorizing Federal study of the proposed project. The study was subsequently initiated in July 1980, and culminates with the preparation of a Feasibility Report which includes this Environmental Assessment.

Background information for this assessment has been obtained through coordination with local, State and Federal agencies, and others, and a search of both published and unpublished literature. The assessment is followed by a Finding of No Significant Impact (FONSI).

II. The Study Area

The East Boat Basin is a small harbor located along the south side of the Cape Cod Canal in Sandwich, Massachusetts (See Figure 1). The basin was originally constructed in the late 1930's as part of the canal-widening project performed by the Corps of Engineers. Based on increased use of the basin during the 1950's by commercial fishing and recreational boating interests, the original basin was expanded to its present size in 1963.

The basin is part of the overall Cape Cod Canal navigation and recreation system that is owned and operated by the Corps of Engineers. This region provides many recreational opportunities for a large portion of southeastern Massachusetts and lower Cape Cod. Sandwich itself greatly expands in population during the summer due to an influx of summer residents and tourists. The excellent location of the East Boat Basin, just inside the eastern end of the canal, provides the only reasonable access point to Cape Cod Bay for recreational boating, within a 10 to 20 mile radius. In addition to recreational boating, camping, picnicking, hiking, fishing, cycling, and sightseeing are other popular activities that take place in the area.

Although ^{a large} ~~the~~ major portion of Sandwich's economy is based on leisure time activities, ~~some~~ industry supports it also. The predominant

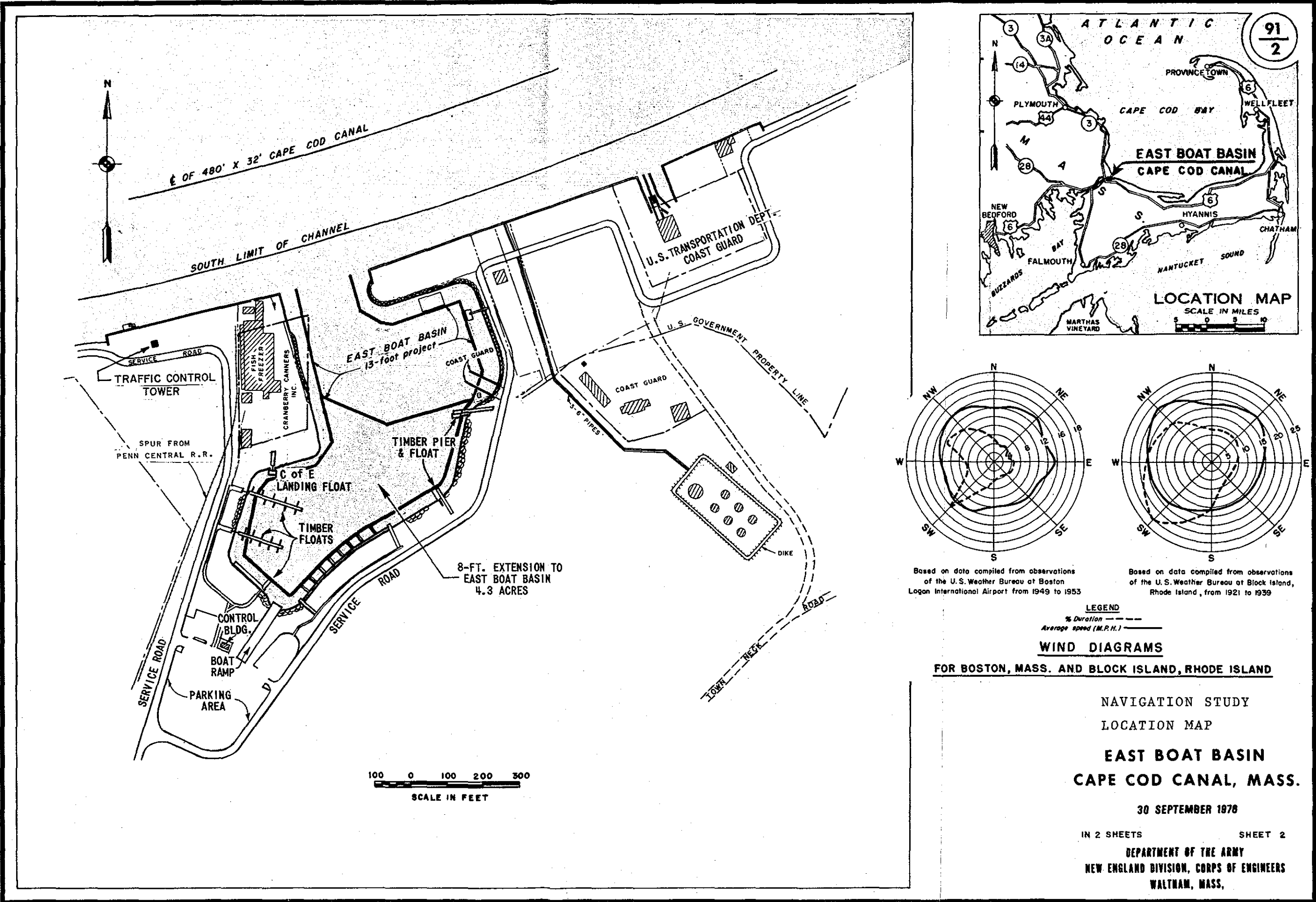


FIGURE 1

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industries include electric power generation at the Canal Electric powerplant, and the commercial fishing industry along the Sandwich Bulkhead located just outside the East Boat Basin. Sandwich is the fifth largest fishing port in Massachusetts in terms of pounds of fish landed, realizing a through put of 14 to 20 million pounds annually. Most of the fish ^{are} ~~is~~ presently landed by transient vessels that transit the Cape Cod Canal, indicating that Sandwich is a very desirable location to offload fish.

III. Need for the Action

The East Boat Basin presently provides space to berth about 80 recreational boats in a marina, and about 40 small (20' -70') fishing craft that moor in a raft formation from the one available pier, and also from the shore. Other facilities in the area include a boat launch ramp, recreational areas, parking areas and four fish offloading houses along the bulkhead outside the basin.

Demand for use of the basin has increased to a point that depth and area dimensions have become inadequate. The basin is presently being utilized to an extent that crowded conditions are a problem. The problem^{is} ~~are~~ well understood by the local interests, and therefore they desire to expand the basin. Implementation of the proposed project would provide an excellent opportunity to address ^{the} ~~present~~ problem and develop the East Boat Basin into a full service port for the region.

IV. Project Description

The proposed expansion project involves the excavation of a landcut to provide additional harbor area. The landcut would extend southward from the existing basin into a 22 acre parcel of land owned by the town of Sandwich. The selected plan (Plan C), shown on Figure 2, would provide an additional 9.9 acres of water area comprised of a 4.5 acre commercial berthing area, 12 feet deep; a 1.8 acre recreational berthing area, 8 feet deep; a 450-foot by 160-foot turning/maneuvering area, 14 feet deep; a 670-foot by 30-foot offloading area, 14 feet deep; and a 120-foot wide entrance channel at a depth of 14 feet. In addition to the landcut, dredging would be performed in the existing basin including construction of an entrance channel 180 feet wide at the basin entrance narrowing to a 120-foot width inside the basin, and dredging the present 8-foot deep area on the east side to a depth of 12 feet. The basin expansion perimeter would be protected by riprap stone protection, with bulkhead used in and around offloading areas to facilitate anticipated fish offloading operations. In order to provide the proposed entrance channel width at the basin entrance, the east side would be modified using bulkhead to replace the present riprap.

The total area to be taken up by the expansion of the basin would be about 12 acres, including 2.1 acres of area required for riprap slopes. Total amount of material to be removed would be 533,430 cubic yards, which

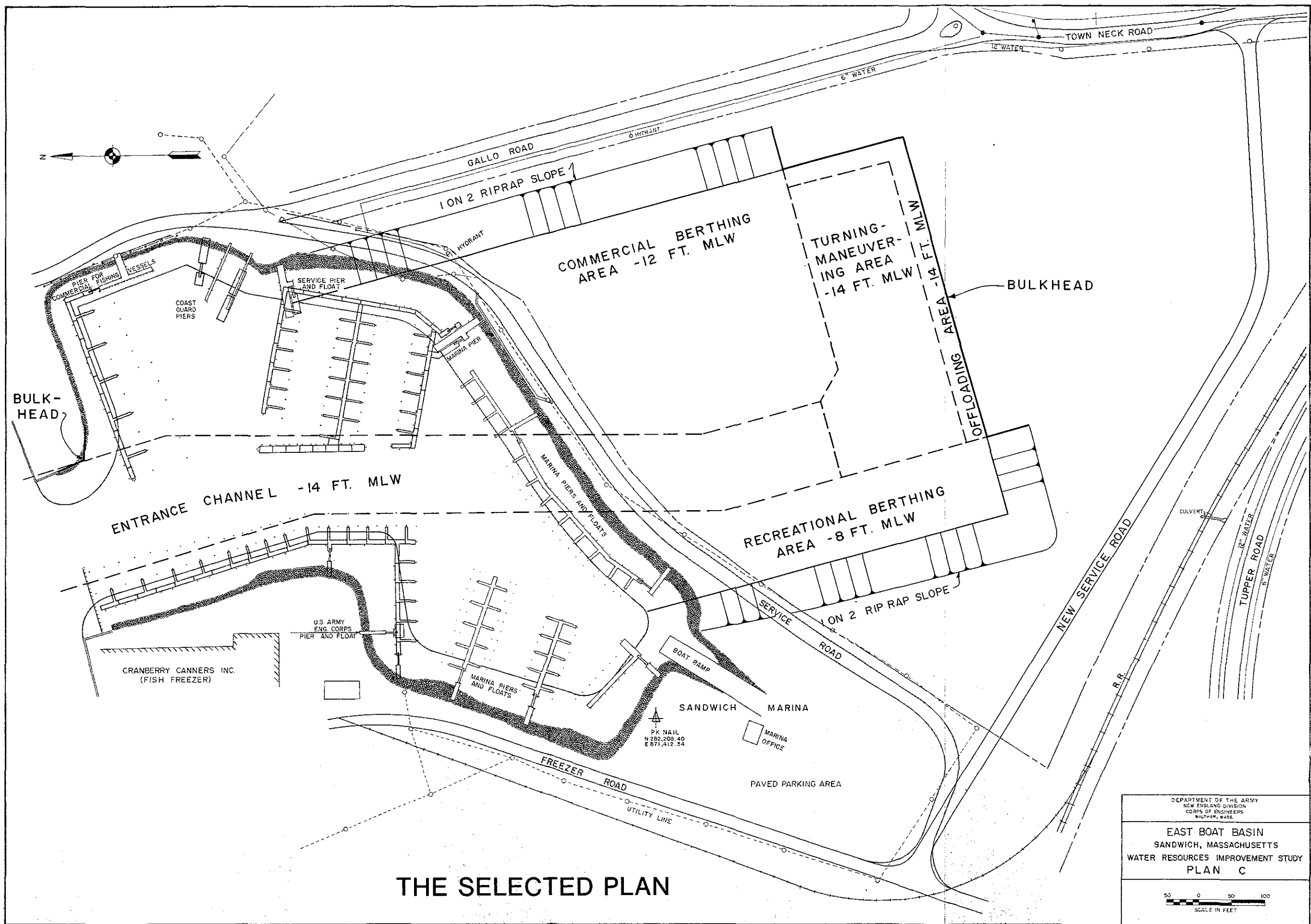


FIGURE 2

includes about 28,510 cubic yards of dredged material. The project would realize a 52 vessel increase in the commercial fishing fleet, and a 15 boat increase in pleasure craft capacity. The construction of the East Boat Basin expansion would be expected to take about two years.

The project material would be removed by a combination of excavation and dredging. A clamshell or bucket dredge would be used to first dredge existing basin areas. Then the landcut area would be excavated from above, and/or from the south side of the basin. Material would be placed in scows for dumping at the Foul Area ~~open water~~ ^{ocean disposal} site about 45 miles to the northeast of the boat basin. ^{located}

V. Affected Environment

A. At the Project Site

1. Topography and Geology - The terrain surrounding the Cape Cod Canal consists of rolling hills; the highest is 177 feet above mean sea level. The soil is predominantly sandy with rocks and stones, and the area is well forested.

The site of the East Boat Basin expansion is generally flat and largely covered with fill from the initial expansion of the basin and the construction of the nearby power plant. Since Cape Cod was formed during the last advance of the continental ice sheet more than 10,000 years ago,

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the natural soils at the site are outwash and glacial lake deposits. Upper portions of the soil profile are predominantly glacial outwash silts, sands and gravels overlying layers of peat, clay, and silt deposits. The deeper soils are highly overconsolidated, probably due to a readvance of the ice sheet after deposition.

✓ 2. Climatology - The Cape Cod climate offers very comfortable spring, summer and autumn temperatures. The winters are cold, often with subfreezing readings. At all seasons, however, the climate is more moderate than at nearby inland locations. The average January and July temperatures at the East Wareham Weather Station are about 29°F and 71°F, respectively. Extreme temperatures have been recorded at -24°F and ~~X~~99°F. Precipitation is well distributed throughout the year and averages about 47 inches.

3. Aquatic Ecosystem - The Cape Cod Canal waters are designated as SB quality, which means they are "suitable for bathing and recreational purposes including water contact sports; industrial cooling; excellent fish habitat; good aesthetic value; and suitable for certain shell fisheries with depuration."

The canal is one of the most prolific and fruitful sport fisheries in New England. It offers many different types of fish, with the most common, in terms of catch, being Atlantic cod (Gadus morhua), Atlantic mackerel (Scomber scombrus), winter flounder (Pseudopleuronectes

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americanus), pollock (Pollachius virens) and tautog (Tautoga onitis). Other species caught include striped bass (~~Morone~~ saxatilis), bluefish (Pomatomus saltatrix), rainbow smelt (Osmerus mordax), chub mackerel (Scomber japonicus), blue runner (Caranx crysos), Atlantic tomcod (Migrogadus tomcod), red hake (Urophycis chuss) and American eel (Anguilla rostrata).

Fairly abundant fish with little or no commercial or sport fishing value are cunner (Tautoglabrus adspersus), Atlantic silverside (Menidia menidia), rock gunnel (Pholis gunnellus), longhorn sculpin (Myoxocephalus octodecemspinosus) and grubby (Myoxocephalus aeneus).

Alewives (Alosa pseudoharengus) gather during April, May, and June at the Bournedale Herring Run, several miles west of the boat basin. Schools of juvenile clupeid fish, including Atlantic herring (Clupea harengus) and Atlantic menhaden (Brevoortia tyrannus) are present in the canal during late summer and early fall.

The Cape Cod Canal contains a diversified population of benthic flora and fauna with representatives of both the Cape Cod Bay and Buzzards Bay waters. Sampling conducted in the late 1960's found approximately 100 species of invertebrates, 26 species of algae and one flower macrophyte in areas of the canal. The primary difference ^{re} up from one end of the canal to the other is abundance rather than species composition, with decreasing numbers from west to east corresponding to the transition from a more

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rocky bottom at Buzzards Bay to a more sandy, gravelly substrate to the east. The canal waters do not contain a large shellfish population.

4. Terrestrial Ecosystem - The site of the proposed East Boat Basin expansion is generally covered with grasses and bushes. Northern bayberry (Myrica pensylvanica) is common. Near the center of the site a small open wet area is surrounded by phragmites (Phragmites communis) and a narrow ring of saltmarsh cordgrass (Spartina alterniflora). It is doubtful that the site contains any significant wildlife habitat or value.

5. Threatened and Endangered Species - There are no known threatened or endangered species of plants or animals inhabiting the waters of the current East Boat Basin or the area of the proposed East Boat Basin expansion.

6. Historic and Archaeological Resources - The area of proposed harbor improvement is currently fill land deposited during initial dredging of the basin in the late 1930's and during expansion in 1963. Surface elevation prior to that time appears to have been at near sea level and the area was probably wetland with low potential for presence of archaeological or historic resources.

7. Socioeconomic Resources - The population of Sandwich has grown at a rapid rate far in excess of the rate experienced in Massachusetts. The rapid growth witnessed in Sandwich has been evident

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throughout Barnstable County as well. In 1980, Sandwich's year-round population was 8,727. This population more than doubles with the influx of the summer population.

Sandwich's economy is dependent on the seasonal activity which peaks in July and August. The trade and services sectors are the two largest employers in both the town and the county. Unemployment is a major problem facing the labor force because of the seasonal fluctuation of economic activity. Unemployment peaks during the winter months and on an annual basis generally exists at a higher level than State and national averages.

Census figures indicate that over 90 percent of year-round housing units in Sandwich are single family structures. Planning Commission data indicates that approximately 70 percent of all Sandwich's housing is used on a year-round basis. The majority of recent construction has been in year-round housing units, a trend expected to continue.

Residential use comprises the largest share of developed land, although the majority of Sandwich remains in an undeveloped natural wilderness state. A third of Sandwich's land, however, is controlled by the Federal Government at Camp Edwards and Otis Air Force Base.

8. Recreation - The East Boat Basin is a very popular location on the Cape Cod Canal for public recreation. The marina provides berths

*commercial fishing vessels do not
receive berths, only recreational vessels
a few charter boats for hire*

for recreational boating and ~~commercial fishing vessels~~ in a facility

operated by the town of Sandwich. The commercial fishing operations at the ~~marina~~ ^{boat basin} and at four adjacent fish packing plants is a strong attraction to the visiting public, especially the many tourists who come to Cape Cod for its nautical atmosphere. The basin is the second busiest commercial fishing ~~port~~ ^{port} on Cape Cod and the fifth busiest in Massachusetts. Public day use areas are provided by the Corps at both the east and west sides of the entrance to the ~~port~~ ^{boat} basin. The east recreation area includes a comfort station, picnic tables and a paved parking area for 73 vehicles. The bulkhead provides convenient access to the canal edge for fishing and sightseeing. The west recreation area includes a comfort station, a few picnic tables and parking for 64 vehicles. The bicycle path along the canal's southern service road, extending over 6 miles from the railroad bridge over the canal, terminates at this parking area.

Sightseeing is the most popular activity at the basin, followed by fishing, hiking, jogging, picnicking and bicycling. Fishing is permitted in the canal but not in the basin itself.

Visitation
~~Visitation~~ to the basin area totals over 400,000 annually. Only the Herring Run in Bourne ^{Route} 6 has more visitation [?] of the canal.

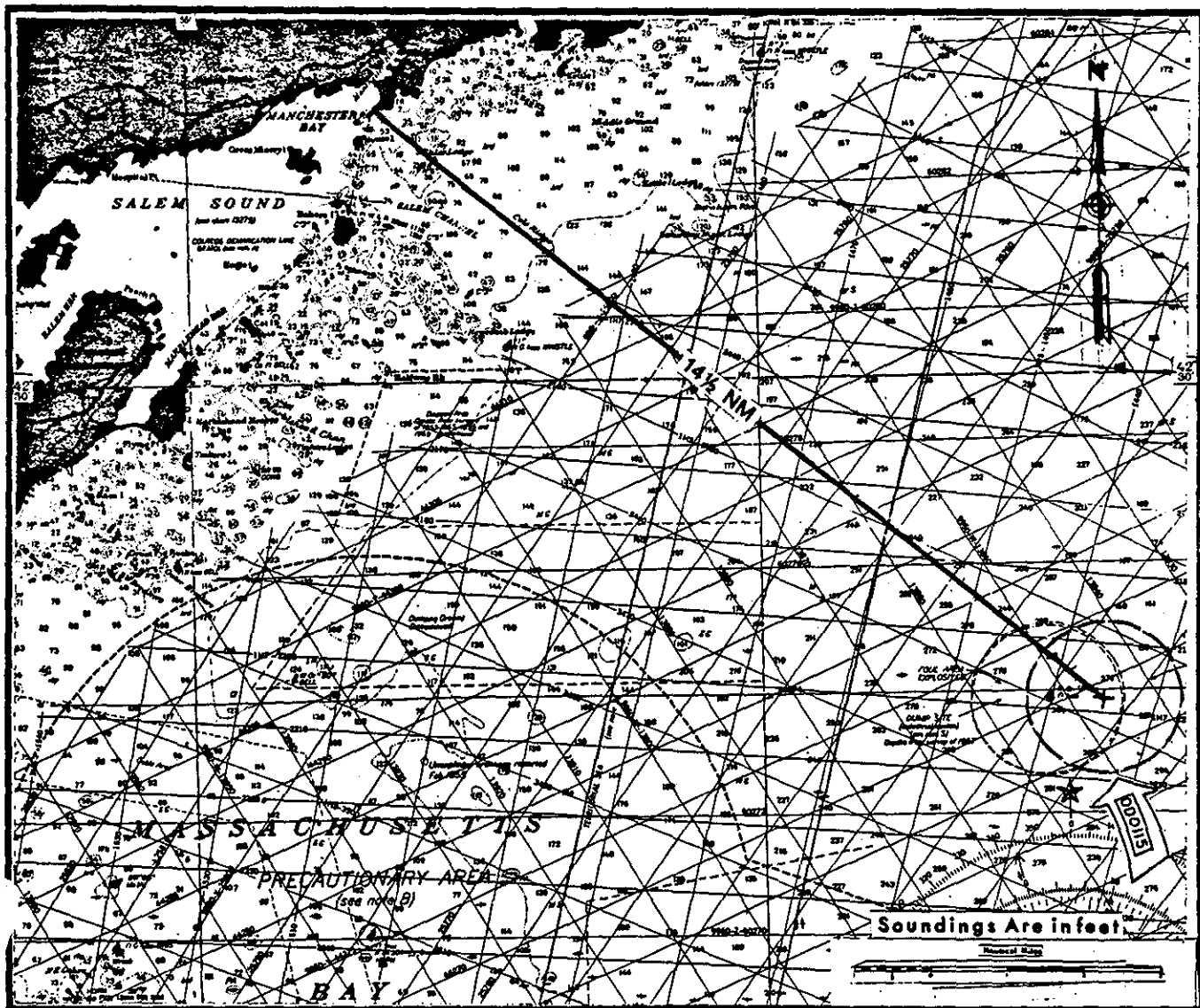
B. At the Selected Disposal Site - The Foul Area

1. General - The Foul Area is one of three EPA-approved ocean

disposal sites in the New England region. This area presently has an

indefinite interim designation status pending the development of an EIS for final designation. The site is located in Massachusetts Bay approximately 45 nautical miles northeast of the Cape Cod Canal. It is a circular area with a diameter of two nautical miles centered at $42^{\circ} 25.7'N$, $70^{\circ} 34.0'W$ as shown on figure 3. The general area has a history of being used for the disposal of various industrial wastes and dredged material. The currently designated site is available only for the disposal of dredged material that is found to be in compliance with EPA's Ocean Dumping Criteria (Section 102, 40 CFR 227). The most recent use of this site was for Federal and private maintenance dredging during 1982 and 1983 in the Boston Harbor area in which approximately 1 million cubic yards of material was dumped.

2. Physical and Chemical Characteristics - Physiographically, the site lies within the Stellwagen Basin, an elongate depression over 20 miles in length with a northwest-southeast trend. The dump site is situated in a 300-foot depression which is separated from the Stellwagen Bank area on the east by a 200-foot high slope. Surveys performed by the New England Aquarium (NEA, 1975) and the Naval Underwater Systems Center (NUSC, 1978) identify the natural bottom of the Foul Area as being rather flat and featureless. Bathymetric surveys have disclosed a variety of disposed objects including sunken vessels, munitions, concrete casings, metal drums and other debris along with dumped harbor sediments scattered throughout the general area. No investigations have detected any significant accumulation of spoil material in the area. However, a study of an actual



FOUL AREA, MASS. BAY

EPA 0D0115: FOUL AREA
 N.O.S. CHART: 13267
 DATE: 20 DECEMBER 1980
 DEPTH RANGE: 159 TO 304 FEET MLW
 CENTER COORDINATES: 42°-25.7'N, 70°-34.0'W
 DESCRIPTION: THIS EPA APPROVED INTERIM SITE IS A CIRCULAR AREA WITH A DIAMETER OF 2 NAUTICAL MILES AND CENTER AT 42°-25.7'N, 70°-34.0'W. FROM THE CENTER, THE MARBLEHEAD TOWER BEARS TRUE 282° AT 24,300 YARDS AND BAKERS ISLAND HORN BEARS TRUE 300° AT 24,300 YARDS.

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dumping operation at the Foul Area, by NEA, ~~has~~ observed that a significant portion of the discharged dredged material settled rapidly to the bottom and remained in place.

~~K~~ ~~indent further~~

Water - Bottom currents in the vicinity of the Foul Area have been investigated by NEA and others. The NEA study, performed in 1973 and 1974, recorded bottom currents of no greater than 17 cm/sec (.3 knots) with most velocities measured as being less than 10 cm/sec (~~0.2~~ ⁹.2 knots). This indicates that currents are low and insufficient for any significant spoil dispersal. There is some question as to the extent of the effect of tidal forces on the bottom currents at the Foul Area. The NEA study concluded that the direction of bottom currents are variable depending on the season with general trends as follows:

Winter - SE

Summer - W

Spring - S or W

Fall - N

The water temperature profile at the Foul Area has also been investigated by NEA. The water column is relatively isothermal during the spring with the temperature varying between 3.7 and 4.8°C. However, it is apparent that a thermocline begins to develop in May and reaches a peak by mid-summer. At that time the nearsurface water has been recorded at 19°C and the near-bottom at approximately 5.5°C. Various depth measurements indicate that a majority of the thermocline may occur between 10 and 30 feet below the water surface.

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The background salinity for the area is approximately 32 ppt.

Available data shows little change during the fall and winter, but a decline during the spring. It has been suggested that this may result from fresh water input from the Merrimack River. Dissolved oxygen levels are found to be influenced by the various periods of primary production and ~~planton~~ ^{plankton} die-off. The lowest concentration was noted to be 6.8 mg/l at the surface during April. The fall decline throughout the water column is attributed to increased levels of respiration while the influence of the spring and summer blooms are evident. During the summer, oxygen levels have been noted to be above saturation at some locations. The nutrient relationships also reflect the influence of phytoplankton growth and die-off, particularly as the level of phosphorus declines sharply and the nutrient becomes limiting in the trophogenic zone. There are rising concentrations of nutrient material during the summer below the thermocline. Increased concentrations of ammonia have been found near the bottom during disposal of dredged material. Average annual nutrient levels for the Foul Area waters are indicated in Table ~~2~~¹, together with average annual metal levels.

With the exception of periods during which dredged material was being dumped, trace metal levels generally have been at relatively low levels. Lead, however, reflects some seasonality, and some differences in the concentrations of other metals are detected between stations and at certain depths.

Table 1
Foul Area Water Quality

~~check to 1000~~ ✓
~~1000~~

<u>Parameters</u>	<u>Annual Mean Concentrations (ug/l)</u> beats
Nitrate N	104
Nitrite N	3.3
Ammonia N	44
Ortho Phosphate	25
Lead	2.3
Zinc	21
Cadmium	0.32
Chromium	0.4
Copper	2.3
Nickel	2.8

Data from New England Aquarium (1975)

~~All values are annual mean concentrations in ug/l~~

Sediments - Sediments in the Foul Area are primarily composed of fine-grained silts and clays with some sand, gravel and other glacial deposits in the northeast portion of the area. Acoustic profiling of the areas in Stellwagen Basin at the Foul Area proper indicates that thick deposits of recently deposited sediments are accumulating in the basin. It is thought that the basin is a natural sediment sink for fine-grained terrigenous sediments from the Massachusetts coast, perhaps from as far away as the Merrimack River. ✓

Chemical properties of the Foul Area sediments have been investigated by NEA (1975), NUSC (1978) and SAI (1982). There are some variations in constituent concentrations among the several sites sampled but the differences are not considered to be significant. The variations are attributable to different dredged materials dumped in the area. Table 2 presents average sediment concentrations at the Foul Area, East Boat Basin and various Federal project harbors within the Gulf of Maine tidal system. Comparison of the data shows the Foul Area sediments to be reasonably consistent with the mean values for various harbors throughout the tidal system. This is expected since the dumpsite has been used for disposal of material dredged from many of the harbors. Oil and grease and copper are two constituents found considerably lower in the Foul Area sediments relative to the harbor averages.

Sediment concentrations at the Foul Area are considerably higher compared to the East Boat Basin project test data. The uncontaminated

Table 2
that for the
 Comparison of Sediment Quality at the Foul Area with East Boat Basin and for Various Harbors Throughout the Gulf of Maine Tidal System

Soil Description	Composite of East Boat Basin Sediments/Materials		Foul Area Sediments			Various Harbors Throughout the Gulf of Maine Tidal System 1969 to 1980	
	(dredge area)	(excavation area)	NEA Composite(1975)	NUSC/DAMOS (1978)	SAI/DAMOS (1982)	mean	mean plus one SD
Soil Description	organic silty clay and sand	medium/fine sand	silty clay	-	sandy silty clay		
% Vol Solids	3.2	.93	7.62	17.65	4.34	4.37	9.36
Oil & Grease	901.8	< 41	940	ND	-	2532	6361
Mercury	< .07	< .08	0.59	.24	.14	.57	1.78
Lead	< 65	< 30	60.94	52	94	83.2	184
Zinc	117.3	95.7	140.44	92.5	208.6	134.5	285.5
Arsenic	7.2	< 2.05	13.25	-	13.14	6.98	14.64
Cadmium	< 3	< 3	3.43	.44	ND	3.12	9.37
Chromium	< 59	< 30	73.75	87	43.9	112	337.4
Copper	34	< 10	21.13	21.4	40.7	83.2	212.6
Nickel	< 40	< 40	37.56	33.5	31.3	36.3	64
Vanadium	< 200	< 200	53.69	-	ND	60.9	119.8
PCB's	< .005	< .005	-	-	ND	.61	1.65

* All concentrations, except for volatile solids, are expressed in ppm
 ND denotes concentrations below laboratory detection limits

✓

nature of the boat basin material is attributed to its predominantly granular nature and the lack of any significant sources of pollution as explained in detail in ^{Section VII C1} of this assessment.

3. Aquatic Resources

Benthos - Biological data on the Foul Area has been collected in a major effort by NEA (see Table 3). In addition, the Naval Underwater Systems Center (NUSC) and Science Applications Inc. (SAI) collected data for NED's Disposal Area Monitoring System (DAMOS) during three separate single-day samplings (See Tables 4, 5, and 6). Benthic samples collected show there to be high diversity but low numbers of individuals present. Since dredged material disposal has been a continuing activity in this area the types and quantities of organisms found represent a disturbed but functioning benthic community. The most dominant organisms are the polychaete worms, Spio filicornis, Heteromastus filiformus, Ninoe nigripes and Sternaspis scutata. In addition to polychaetes, various mollusks, shrimp and starfish have been found to inhabit the dumpsite area, but in smaller numbers. The types of organisms observed at the Foul Area are similar but less in number than other nearby areas (NEA, 1975¹⁹⁷⁸ and NUSC, 1978).

Because of its disturbed condition, the Foul Area is not felt to contribute significantly to the overall productivity of Massachusetts Bay.

? TABLE 3
 BENTHIC ~~TOTAL~~ SPECIES RECOVERED ~~AT THE~~ FOUL AREA (NEA, 1975)

	North				Center				South				East				West				Control			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Priapulida																								
Priapula caudatus																						2		
Sipunculoidea																								
Golfingia sp.	5	8							9	55	9		8	3			11	8			10	9	4	
Phascolion strombi															2								1	
Nemertea																								
Micrura albida																	1						1	
Nemertine sp.																					1			
Mollusca																								
Gastropoda																								
Acmaea testudinalis*						1																		
Admete couthouyi*				1																				
Buccinum undatum*				1	1	1	6						1	1	1						1			
Colus pygmaeus*																	1							
Crepidula convexa*				1	1		5																	
Hydrobia minuta*												5												
Littorina obtusata*												1												
Mitrella lunata*					5		9																	
Nassarius trivittatus*					1		5	1																
Polinicies immaculata							2			1														
Retusa obtusa*							3	1																
Scaphander punctostriata*																						2		
Triphora perversa																								
nigrocincta*				1	3		28	1																
Turbonilla interrupta*					1		6	6																
Urosalpinx cinera*								2																

*No living representatives of these species were recovered.

TABLE 3 (Continued)

	North				Center				South				East				West				Control			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Mollusca																								
Pelecypoda																								
Anomia simplex*							2				1				1									
Astarte quadrans*			1																					
Astarte undata			3	1			1								25		1							
Cerastoderma pinnulatum				1						1		1			18			1	7	1				
Crassostrea virginica*								3																
Crenella faba*																1								
Crenella glandula*																3								
Gemma gemma*								8																
Hiatella arctica														1										
Hiatella striata																			2					
Kellia suborbicularis*								11																
Macoma balthica*			1								1													
Macoma calcarea		1	2	2			5	6			1			1	5		1			3		3	1	
Mulinia lateralis*								2																
Mya arenaria*						+	+	+	9		+										2	1	1	
Mytilus edulis*						+	+	+	4		+								+					
Nucula tenuis			9	3				2			3	2	1			2	9			1	2		1	
Nuculana pernula			1							1						2						1		
Pitar morrhuana*							1															1		
Placopecten magellanicus*																1								
Thyasira sp.	4	2	2	18		2	6	5	2		38	19	1	23	7		4		15		4	7	9	
Venericardia borealis															5									
Yoldia inflata*											1	3					1			2			1	
Yoldia iris				2			1					2	1		1			1				1		
Yoldia lucida*									1		1		1									2		
Yoldia subangulata*	1						1					1										2	1	

+Denotes shell fragments.

TABLE 3 (Continued)

	North				Center				South				East				West				Control			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Annelida																								
<i>Ammotrypane aulogaster</i>	1								1				1				1							
<i>Ancystrocyllis groenlandicus</i>											2						1						1	
<i>Apisthobranchus tullbergi</i>											1													
<i>Aricidea quadrilobata</i>	1								1	15			2						3			6	16	4
<i>Capitella</i> sp.		1		6					2		3		1						2				2	3
<i>Chaetozone setosa</i>	9	5		4					15	79	3		7	1			3		8			17	49	22
<i>Ephesiella minuta</i>																	1							
<i>Eteone longa</i>	1	1		1							1								2			1		
<i>Eteone trilineata</i>																	1		1					
<i>Euchone rubrocincta</i>											1				1									
<i>Eunice</i> sp.															1									
<i>Glycera</i> sp.															1									
<i>Goniada maculata</i>		3								1	1	1					3	1			1			7
<i>Harmathoe imbricata</i>	1														1							1		
<i>Heteromastus filiformis</i>	11	22		19		4			6	8	32	12		17	4		6	7	12		7	4	63	8
<i>Lumbrineris fragilis</i>	2										1								6	2			1	2
<i>Lumbrineris latreilli</i>																			1					
<i>Magelona</i> sp.												1												
<i>Maldane sarsi</i>				1					1			1			1									
<i>Nephtys buccera</i>						1	1			1		1										1		1
<i>Nephtys incisa</i>	1	2									1											1		2
<i>Nicomache lumbricalis</i>											1	1							5			2		2
<i>Ninoe nigripes</i>			1	1					1	2	1	2					1	1				1		2
<i>Ninoe</i> sp.	1																							
<i>Pectinaria</i> sp.				3	1										4		1	9						
<i>Phloe minuta</i>				1						1					2			1			1			4
<i>Polydora concharum</i>															1									
<i>Praxillella praetermissa</i>			1																1			1		
<i>Prionospio</i> sp.	6	7		3						2	18	7	1	5	4	2		3	13		1	17	11	21
<i>Scoloplos acutus</i>	1			1					1	2	2	8	1	1		1			14			1		5
<i>Scoloplos armiger</i>																						1		
<i>Spio filicornis</i>		3		8		11				4	57	12		7	18	98		23	38	29		2	148	178

TABLE 3 (Continued)

	North				Center				South				East				West				Control			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Annelida, cont.																								
<i>Stauroanereis caeca</i>													1								1		1	
<i>Sternaspis scutata</i>	3	3		1							2				3				1		1			
<i>Terebellides stroemi</i>																						1		
<i>Tharyx</i> sp. A									1										1					
<i>Tharyx</i> sp. B										1														
Arthropoda																								
<i>Ampelisca macrocephala</i>																	1						1	
<i>Ampithoe rubricata</i>																1								
<i>Anonyx lilljeborgi</i>													1											
<i>Balanus balanoides</i> *						2	+	+							1+	+			+					
<i>Eudorella emarginata</i>				1						3														
<i>Eudorella truncatula</i>															1									
<i>Harpinia propinqua</i>		1								2									1			6	2	2
Echinodermata																								
<i>Ctenodiscus crispatus</i>									1	2													6	
<i>Molpadia</i> sp.									1		1	1												
Number of Individuals	48	59	21	81	16	3	97	68	51	25	321	94	9	52	66	181	13	57	77	131	13	75	338	284
Number of Species	15	13	9	23	11	5	21	17	13	14	27	22	9	12	13	24	5	13	14	24	6	15	30	25

12 44 44

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TABLE 4* AREA
~~REGION FOU~~
 DAMOS BENTHOS ~~TABLE OF NUMERIC DENSITY DATA~~ (NUSC, 1979)

~~STATION: BOTTOM FOU GROUND~~

DATE: 18 DECEMBER 1977

PREDOMINANT SPECIES	DREDGE NUMBER				STANDARD COEFF. OF			95 PERCENT CONF. LIMITS OF MEAN	NUMERIC RANK	% OF TOTAL	CUMUL. % OF TOTAL
	#1	#2	#3	TOTAL	MEAN	DEVIATION	DISPERSION				
1. Ninoe nigripes	7	11	8	26	8.7	2.1	0.5	3.5-13.9	1	14.5	14.5
2. Sternaspis scutata	0	8	15	23	7.7	7.5	7.3	0-26.3	2	12.8	27.3
3. Praxillella gracilis	0	7	7	14	4.7	4.0	3.4	0-14.6	3	7.8	35.1
4. Molpadia oolitica	0	5	6	11	3.7	3.2	2.8	0-11.7	4	6.1	41.2
5. Lumbrineris tenuis	1	7	2	10	3.3	3.2	3.2	0-11.3	5	5.6	46.8
6. Myriodule heeri	0	5	4	9	3.0	2.6	2.3	0-9.5	6	5.0	51.8
7. Yoldia lucida	0	7	2	9	3.0	3.6	4.3	0-11.9	6	5.0	56.8
8. Scoloplos acutus	0	6	2	8	2.7	3.1	3.6	0-10.4	7	4.5	61.3
9. Micrura sp.	0	5	2	7	2.3	2.5	2.7	0-8.5	8	3.9	65.2
10. Ctenodiscus crispatus	1	5	0	6	2.0	2.6	3.4	0-8.5	9	3.4	68.6
11. Goniada maculata	2	3	0	5	1.7	1.5	1.3	0-5.4	10	2.8	71.4
12. Nucula tenuis	0	2	2	4	1.3	1.2	1.1	0-4.3	11	2.2	73.6
13. Spio Filicornis	1	2	1	4	1.3	0.6	0.3	0-2.8	11	2.2	75.8
14. Yoldia thraciaeformis	0	2	2	4	1.3	1.2	1.1	0-4.3	11	2.2	78.0
15. Nephtys incisa	1	2	0	3	1.0	1.0	1.0	0-3.5	12	1.7	79.7
16. Ophiura sarsi	0	0	3	3	1.0	1.7	2.9	0-5.2	12	1.7	81.4
TOTAL	13	77	56	146	48.7	32.6	21.9	0-129.7			
TOTAL NO. OF SPP PER DREDGE	9	31	20	39	20.0	11.0		0-47.3			
SPECIES DIVERSITY (H')	1.87	3.12	2.59	7.58	2.53	0.63					
EQUITABILITY (J')	0.85	0.91	0.87	2.63	0.88	0.03					

TOTAL NO. OF INDIVIDUALS THIS STATION = 179

TABLE ⁵ ~~(continued)~~

~~BOSTON FOUL GROUND REEF SITE~~ ^{AREA}

Date: 6 December 1978

DAMOS BENTHOS (SAI, 1980)

Predominant Species	Sample No.					Number of Individuals				95% Conf. Limits of Mean	Species Abundance Rank	Percent of Total Individuals	Cumulative Percent of Individuals
	1	2	3	4	5	Total	Mean	Std. Dev.	Coeff. of Dispersion				
1. Ninoe nigripes	12	11	9	-	-	42	10.7	1.5	0.2	6.9 - 14.5	1	20.0	20.0
2. Ampharete arctica	12	5	8	-	-	25	8.3	3.5	1.5	0 - 17.1	2	11.9	31.9
3. Lumbrineris fragilis	4	9	12	-	-	25	8.3	4.0	1.9	0 - 18.4	2	11.9	43.8
4. Cirratulid sp.	17	0	0	-	-	17	5.7	9.8	16.8	0 - 30.1	3	8.1	51.9
5. Thyasira insignis	4	10	0	-	-	14	4.7	5.0	5.3	0 - 17.2	4	6.7	58.6
6. Yoldia sapotilla	8	4	1	-	-	13	4.3	3.5	2.8	0 - 13.1	5	6.2	64.8
7. Micrura sp.	7	3	2	-	-	12	4.0	2.6	1.7	0 - 10.6	6	5.7	70.5
8. Scoloplos acutus	8	1	1	-	-	10	3.3	4.0	4.8	0 - 13.4	7	4.8	75.3
9. Goniada maculata	0	2	6	-	-	8	2.7	3.1	3.6	0 - 10.3	8	3.8	79.1
10. Tharyx acutus	0	3	5	-	-	8	2.7	2.5	2.3	0 - 8.9	8	3.8	82.9
11. Spio filicornis	3	1	2	-	-	6	2.0	1.0	0.5	0 - 4.5	9	2.9	85.8
12. Melinna cristata	1	0	4	-	-	5	1.7	2.1	2.6	0 - 6.8	10	2.4	88.2
13. Laonice cirrata	0	3	1	-	-	4	1.3	1.5	1.7	0 - 5.1	11	1.9	90.1

	Sample					Mean	Std. Dev.
	1	2	3	4	5		
Species Diversity (H')	2.54	2.44	2.58	-	-	2.52	0.07
Equitability (J')	0.82	0.86	0.86	-	-	0.85	.02

2823

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6
TABLE 6 (Continued)

Date: 6 June 1979

AREA
BOSTON FOUL GROUND DATA SITE
DAMOS BENTHOS (SAI, 1980)

Predominant Species	Sample No.					Number of Individuals				95% Conf. Limits of Mean	Species Abundance Rank	Percent of Total Individuals	Cumulative Percent of Individuals
	1	2	3	4	5	Total	Mean	Std. Dev.	Coeff. of Dispersion				
1. <i>Spio filicornis</i>	31	57	55	58	147	348	69.6	44.7	28.7	14.1 - 125.1	1	54.8	54.8
2. <i>Heteromastus filiformis</i>	9	8	10	18	2	47	9.4	5.7	3.5	2.3 - 16.5	2	7.4	62.2
3. <i>Chaetozone setosa</i>	1	2	5	5	7	20	4.0	2.4	1.4	1.0 - 7.0	3	3.1	65.3
4. <i>Trochochaeta multisetosa</i>	0	3	1	2	11	17	3.4	4.4	5.7	0 - 8.9	4	2.7	68.0
5. <i>Ninoe nigripes</i>	7	1	3	1	4	16	3.2	2.5	2.0	0.1 - 6.3	5	2.5	70.5
6. <i>Micrura sp.</i>	6	3	3	2	1	15	3.0	1.9	1.2	0.7 - 5.3	6	2.4	72.9
9. <i>Prionospio malmgreni</i>	2	3	2	3	3	13	2.6	0.5	0.1	1.9 - 3.3	7	2.0	74.9
8. <i>Scoloplos acutus</i>	1	0	6	2	3	12	2.4	2.3	2.2	0 - 5.3	8	1.9	76.8

	Sample					Mean	Std. Dev.
	1	2	3	4	5		
Species Diversity (H')	2.32	1.96	2.18	2.36	1.37	2.04	0.41
Equitability (J')	0.75	0.63	0.65	0.70	0.42	0.63	0.13

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← indent further

Fisheries - Stellwagen Basin supports food and spawning habitat for a variety of marine fisheries which are utilized by commercial and recreational interests. Data from trawls in the area indicate that the dominant species are Atlantic cod (^G~~Gadus morhua~~^{morhua}), haddock (Melanogrammus aeglefinus), ^{winter}~~white~~ flounder (Pseudopleuronectes americanus) and little skate (Raja erinacea) (National Marine Fisheries Service, personal communication). Other important species include yellowtail flounder (Limanda ferruginea), sil^ver hake (Merluccius bilinearis), American plaice (Hippoglossoides platessoides), and poll^ock (Pollachius vi^ens). The entire area within the Foul Area dumpsite is closed to both ground fishing and shellfishing (~~per~~ ^Federal Food and Drug Administration^a, personal communication). However, there are no fishing restrictions outside the dumpsite proper.

4. Threatened and Endangered Species - Data from an annual report prepared for the Bureau of Land Management indicates that Stellwagen Bank (east of the Foul Area) is used by two species of turtles and three species of whales (URI, 1981).

The leatherback turtle (Dermochelys coriacea) and the loggerhead turtle (Caretta caretta) are designated by ^{the National Marine Fisheries Service} (NMFS) as endangered and threatened, respectively. Although sightings of both species have been documented in Massachusetts ^{b/} Bay, the loggerhead is more commonly found to the south of the Bay while the leatherback is more common east and south of the ^{b/} Bay area. The disposal site area is not commonly used by these

species. Sitings of a third ^{species of} turtle, the Kemp's ridley (Lepidochelys kemp), which is designated as endangered, have also been recorded in the past but this species prefers shallow water inshore areas (Cape Cod) and does not use the outer Massachusetts Bay for feeding (NMFS, personal communication).

All three species of whales, the humpback, (Megaptera novaengliae), the finback whale (Baleanoptera physalus), and the right whale (Eubalaena glacialis) are designated as endangered. The right whale is more commonly found east and south of the area and ^{is} ~~are~~ not considered ^a potential heavy user^s of the disposal site area. NMFS has indicated that the Stellwagen Bank area is extensively used as a feeding ground by the humpback and finback whales from May through October. Therefore, the latter two species are of concern and will be discussed below.

It has been estimated that there are approximately 2,000 humpback whales in the northwest Atlantic Ocean. Based on studies by the University of Rhode Island (URI) (1981) for the year 1979, at least 600 of this population use the Stellwagen Bank area for feeding and nursing of calves from May through the fall. The movements of these animals are thought to be closely associated with their primary food species, the sand lance (Ammodytes americanus), which have ^s suitable habitat in the clean sand and waters above the Stellwagen Bank (Kenney, et al., 1981).

There are an estimated 3,600-6,300 finback whales in the northwestern

Atlantic Ocean. The URI ~~1981~~ study indicates that 1,100 individuals may use the Massachusetts Bay area. This species is found in other areas of the Bay (eg., Jeffrey's Ledge off Cape Cod) more commonly than the humpback whale. It, therefore, is not as exclusive a user of the Stellwagen Bank area as the humpback. This may be associated with its wider variety of preferred food species which include krill, capelin, squid, herring, and lanternfish (Leatherwood, et al., 1976)

Sitings of both species, based on available data derived from (1) the URI ~~1981~~ report for the year 1979 and (2) the 1981 data compiled by Mr. Mason Weinrich, Principal Investigator for the Cetacean Research Unit Grant, are generally concentrated 3-4 nautical miles (nm) east and northeast of the Foul Area. No sitings were within a 2nm radius of the discharge buoy. The sitings are generally found in shallower water areas (associated with the northern extreme of Stellwagen Bank) where the schooling sand lance are more likely to be found.

5. Historic and Archaeological Resources - As the Foul Area has been repeatedly used for prior disposal, the existence of unimpacted significant historic or archaeological resources is highly unlikely.

VI. Probable Impacts of the Proposed Action on the Environment

A. Introduction Construction-related impacts as well as those pertaining to operation of the improved East Boat Basin can be expected.

These would be of both a short-term and long-term nature. Impacts would occur at both the site of the project and its environs and at the disposal location for the excavated and dredged materials, as well as along transportation routes to the disposal location.

B. At the Project Site

1. Aquatic Ecosystem - Short-term impacts of the dredging would include physical destruction of benthic habitats and organisms as well as those due to settling of sediments and temporarily increased turbidity in the basin. The dredging may also disturb and expose anaerobic bottom sediments, leading to some depletion of dissolved oxygen in these waters. Some hydrogen sulfide gas could also be liberated during dredging, possibly resulting in unpleasant odors. No significant long-term effects are anticipated. Recolonization of benthic organisms within the basin should occur soon after the cessation of the dredging operations. In fact, enlargement of the basin will provide a greater bottom area for a benthic community to develop. A secondary effect of the dredging (and expansion) of the basin may take place, however, due to the increased use of the upgraded facility. More boats could increase pollution potential within the cul-de-sac configuration of the basin.

2. Terrestrial Ecosystem - Expansion of the East Boat Basin should have minimal effect on local and regional terrestrial ecological resources. The site is primarily fill with no apparent significant

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wildlife habitat or value. The small wet area at the center of ~~the~~ ^{the} site containing wetland grasses is not of any significance.

If the basin is expanded, the shoreline would reach further inland into areas that are less affected by salt water at present. The only concern of any significance^e during the earlier stages of this study had been over possible saltwater intrusion on town water supply wells in the area. However, the two water supply wells for the town of Sandwich near the basin were shut down over two years ago.

3. Threatened and Endangered Species - No threatened or endangered species of plants or animals are known to inhabit the waters of the current East Boat Basin or the area of the proposed East Boat Basin expansion.

4. Historic and Archaeological Resources - As the area is currently fill land atop a low-lying natural surface which appears to have been wetland prior to filling, significant archaeological or historic resources are highly unlikely and no project effects are anticipated upon such resources.^e

5. Socioeconomic Resources - The implementation of an expansion project at ^{the} East Boat Basin would result in some short-~~and~~ long-term impacts on the socioeconomic resources of the area.

Short-term effects would result from construction activities with an expected duration of 2 years. Construction activities would increase local air and noise pollution levels. Movement of excavated and dredged material by barge through the basin to the canal and into Cape Cod Bay would add to the basin's congestion and also impact traffic in the canal. However, it is expected that excavation and dredging activity will be ~~X~~limited during the busiest summer months. Alternatively, the material could be trucked to the bulkhead and ^{to}~~X~~aded on barges, thus eliminating barge congestion in the basin, but increasing interference with vehicular traffic around the basin.

3LH ?
The most significant long-term effect of the expansion project is alleviation of congested basin conditions and demands on the commercial and recreational opportunities. The Corps plan suggests separating the commercial and recreational fleets; placing the commercial vessels on the east side of the basin, and recreational boats on the west. This shift ~~plus~~ ~~in the expansion of the expansion project~~ would result in reducing the without-project capacity by 40 recreational spaces. These boats, however, would be accommodated in the expansion area. Another element of the plan would be the provision of dry storage for small recreational craft. Dry storage is an appealing element because it further reduces demands of recreational boating interests while only requiring a limited amount of water space for a dock. The town, however, would be responsible for dredging the areas where slips would be placed, placement of slips and provision~~X~~ and management of a dry storage facility.

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Long-term effects on the commercial industry are realized through increased landings. These have been enumerated for each plan in the economic analysis. Commercial space in the expansion area would allow for a doubling of the commercial fleet. However, it is estimated that half of this new fleet would be transfers of boats from other ports.

The area surrounding the expanded area would provide the opportunity for development of facilities needed by the fishermen, including facilities to freeze and pack fish, repair boats and equipment and manufacture ice. There may be additional development to attract tourists and satisfy recreational boaters. The expansion, along with subsequent development, would provide numerous local benefits including increased berthing ~~fees~~, property ~~taxes~~ on new pleasure boats, property taxes from new buildings ~~and fees~~ from leased industrial land.

A comprehensive planning effort would be required by the town to promote appropriate development of the area and proper management of the facilities to assure that the basin's potential is reached.

Any on-land traffic problems that may result from expansion of the basin are expected to be minimal, according to the Town Engineer. Some traffic restrictions for the various roads entering the area should be considered, in order to prevent any conflict of activities. An example would be to allow only commercial fishing related traffic to use ~~Town Neck~~ and Gallo Road ~~for access~~, and allow access to recreational areas via

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Freezer Road on the west and Coast Guard Road, which runs parallel to Gallo Road, further east. A service road would have to be maintained around the expansion in order to comply with Corps of Engineers requirements.

6. Recreation - Some inconvenience to recreational users may occur during construction, however, no significant negative long-term effect on recreation in the area is expected. The site to be excavated in the expansion is not currently used for recreation. The increased berthing facilities may in fact make the area more attractive to sightseers.

C. Disposal of Excavated and Dredged Material

As previously mentioned, the Foul Area is only available for the discharge of dredged material that has been found to be in compliance with EPA's Ocean Dumping criteria (U.S. EPA, 1977). The criteria specify certain restrictions and sediment testing that must be applied to material proposed to be dredged in determining the ecological acceptability of its disposal in ocean waters.

Subpart B (Environmental Impact) of these regulations contains the specific guidelines to be considered for determining compliance.

Part 227.5 prohibits ocean dumping high-level radioactive wastes;

materials used for warfare; insufficiently described materials; or persistent, inert substances that may interfere materially with legitimate uses of the ocean. The material to be dredged and excavated from the East Boat Basin area is not known to contain any of those substances. The material will be dumped within an area designated solely for that purpose and should not interfere with any other legitimate uses of the ocean.

Part 227.6 prohibits the ocean disposal of material containing mercury (Hg), cadmium (Cd) and organohalogens as well as their compounds, oil of any kind or any form and known or suspected carcinogens, mutagens or teratogens in greater than trace amounts. ~~(These constituents are in no more than trace amounts in the East Boat Basin material, as determined by tests on the sediments to be dredged and excavated (see following sections for test details).~~ ^{These constituents are in no more than trace amounts in the East Boat Basin material, as determined by tests on the sediments to be dredged and excavated (see following sections for test details).} ~~considered to be present in trace amounts by the analysis of relevant sediment testing in this area~~ ^{SEE REWRITE}

1. Environmental Testing at the East Boat Basin - Environmental testing was performed on material from both the proposed landcut (excavation) and the existing basin (dredging) areas. Figure ⁴/₃ shows the sampling locations.

The test results on the material to be excavated represent borings at locations A, B, and C. The test results on the material to be dredged are from locations D (surface grab sample), E (surface grab sample), and F (sediment core).

Bulk chemical and physical analyses of samples A, B, and C were

performed on composites of the material from the entire depth of each boring. Surface grab samples at D and E and the sediment core at F were



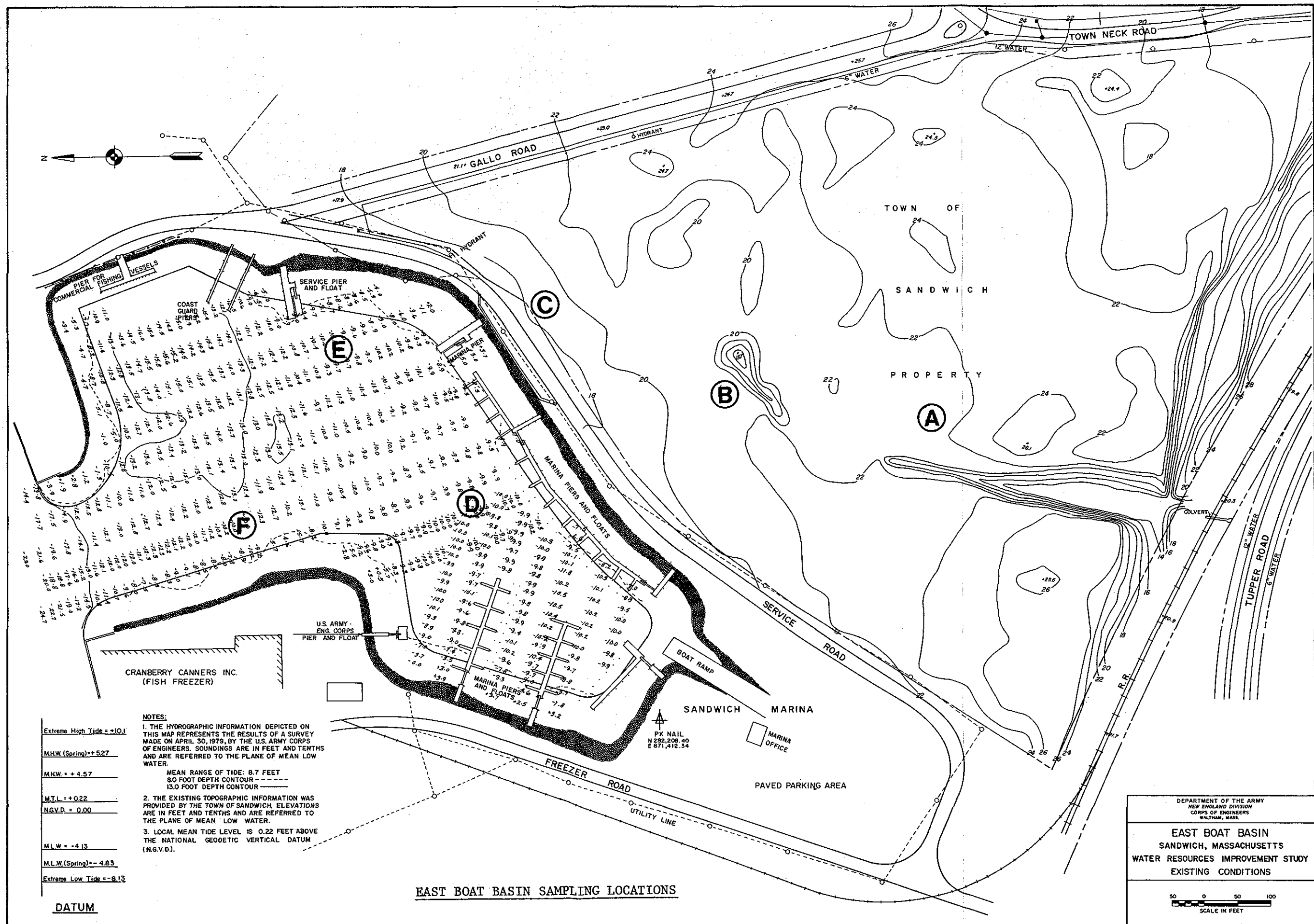


FIGURE 4

also analyzed for chemical and physical characteristics. The physical test results are presented in Tables 7 and 8. Bulk sediment chemistry results are presented in Table 9. Elutriate tests were performed only on sample E, comprising three separate analyses (Table 10). The Extraction Procedure (EP) Toxicity Test was performed on material from all six sample locations (Table 11). Gradation curves have also been prepared for samples representing all six locations (Figures 5 through 10).

Physical results show that composite samples from borings made at locations A, B, and C have a wide range in grain size and average 75 percent sand and gravel. The spread in grain size reveals that the borings transected fill material and glacial till. Sediment from the basin (samples D, E, and F) becomes steadily coarser towards the basin entrance. The sand/gravel fraction is only 10 percent of the sediment at location D, but increases to 52 percent at location F.

The bulk chemical data for the basin sediments show the material to be uncontaminated. A majority of the values are below available averages for harbor sediments within the Gulf of Maine tidal system, of which the Est Boat Basin is a part. There are no values substantially (over one standard deviation) greater than the harbor averages. Average concentration values in the land samples were lower than those of the basin samples. PCB and DDT values were below the instrument detection limits for the elutriate and bulk samples. The only substance in significant quantity in the EP Toxicity Test was barium. It should pose no problems, inasmuch as the concentration is well below the EPA limit for hazardous

Table ~~1-1~~ 7
East Boat Basin
Physical Test Results - Landcut Sediment Samples

<u>Parameter</u>	<u>Sampling Location</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
✓ Visual Classification	Light Brown Silty Gravel, Medium Fine Sand (SM)	Light Brown Gravel, Silty Medium to Fine Sand (SM)	Brown to Gray Silty, Medium to Fine Sand (SM)
Grain Size			
D ₅₀	0.400	0.200	0.400
D ₇₅	1.300	2.000	3.200
D ₂₅	0.160	0.020	0.620
Sorting Coefficient	8.125	70.71	26.64
Curve Type	Bimodal	Bimodal	Bimodal
✓ Specific Gravity	2.64	2.62	2.65
Percent Fines	17	35	26
Percent Solids	89.80	83.15	89.72
Liquid Limit	Values for these parameters that are representative of the landcut material can be found on the gradation curves of the Slope Stability Investigation, Appendix B.		
Plastic Limit			
Plastic Index			
Percent Volatile Solids - EPA	0.9	2.5	1.2
Percent Volatile Solids - NED	0.6	1.6	0.6
Percent Natural Moisture Content	11.94	22.51	9.09

28-36
16-27
2-17

These value ^{ranges} were obtained from the foundation investigation performed for the study, and are representative of these parameters in the landcut.

Table ~~8-8~~ 8
East Boat Basin
Physical Test Results - Marine Sediment Samples

Parameter	Sampling Location		
	<u>D</u>	<u>E</u>	<u>F*</u>
Visual Classification	Dark Grey, Organic, Fine Sandy Silty Clay (OH)	Dark Grey, Organic Sandy Silty Clay (OH)	Dark Grey, Organic Silty Fine Sand (SM)
Grain Size			
D ₅₀	0.0170	0.0470	0.0670
D ₇₅	0.0380	0.0110	0.0860
D ₂₅	0.0045	0.0130	0.0230
Sorting Coefficient	8.4444	0.8462	3.7391
Curve Type	Normal	Normal	Normal
Specific Gravity	2.58	2.6	2.63
Percent Fines	85	60	48
Percent Solids	50.5	51.6	35.8 (74.41)
Liquid Limit	77	60	37
Plastic Limit	32	30	28
Plastic Index	45	30	9
Wet Unit Weight (PCF)	-	-	X 102.63
Dry Unit Weight (PCF)	-	-	X 63.30
Percent Volatile			
Solids - EPA	4.8	3.6	7.2 (2.7)
Percent Volatile			
Solids - NED	3.2	2.6	5.4 (1.6)

*Two depths were tested. Figures not in parenthesis represent results from a bottom surface sample. Figures in parenthesis represent results from a sample taken from a depth of 3.0' - 3.3' below the harbor bottom.

Table 9

East Port Basin Bulk Sediment Chemistry Test Results

Parameter	Sampling Location						
	A	B	C	D	E	F*	
Percent Solids	89.8	83.15	89.72	50.5	51.6	35.8	(74.41)
Percent Volatile Solids - EPA	0.9	2.5	1.2	4.8	3.6	7.2	(2.7)
Percent Volatile Solids - NED	0.6	1.6	0.6	3.2	2.6	5.4	(1.6)
Chemical Oxygen Demand - ppm	3,140	36,370	63,460	48,000	33,000	70,800	(8070)
Total Kjeldahl Nitrogen - ppm	390	920	530	1,640	1,560	4,050	(440)
Oil & Grease	<30	32	61	773	448	2290	(96)
Mercury (Hg) - ppm	<0.05	0.13	<0.05	0.10	0.07	<0.05	(<0.05)
Lead (Pb) - ppm	<30	30	<30	80	87	63	(<30)
Zinc (Zn) ppm	82	196	59	121	133	196	(69)
Arsenic (As) - ppm	<0.05	2.7	3.4	9.5	9.5	6.4	(3.5)
Cadmium (Cd) - ppm	<3	<3	<3	3	3	<3	(<3)
Chromium (Cr) - ppm	<30	<30	<30	78	79	48	(<30)
Copper (Cu) - ppm	<10	<10	11	39	55	30	(12)
Manganese (Mn) - ppm	76	153	421	170	123	134	(78)
Nickle (Ni) - ppm	<40	<40	<40	<40	<40	<40	(<40)
Silver (Ag) - ppm	<15	<15	<15	<15	<15	<15	(<15)
Vanadium (V) - ppm	<200	<200	<200	<200	<200	<200	(<200)
DDT - ppb	<5	<5	<5	-	<5	-	(-)
PCB - ppb	<5	<5	<5	-	<5	-	(-)

*Two depths were tested. Figures not in parenthesis represent results from a bottom surface sample. Figures in parenthesis represent results from a sample taken from a depth of 3.0' - 3.3' below the harbor bottom.

Table ~~9~~ 10
East Boat Basin
Elutriate Test Results

Results of tests performed on: (1) the standard elutriate prepared from one part sediment taken at various sampling locations with four parts water from each sampling location and (2) the virgin water from each sampling location are as follows:

Test Property	Dredge Site Water	Standard Elutriate Designation and Sediment Depth Used in Preparation		
		E-EW	E-EP-81 →, G3 ; ← Surface	R1 R2 R3
Nitrate-Nitrate Nitrogen (N), ppm	0.04	<0.03	<0.03	<0.03
Ammonia Nitrogen (N), ppm	0.19	0.65	1.1	0.97
Sulfate (SO ₄), ppm	2,090	2,180	1,840	1,870
Oil & Grease, ppm	0.64	0.25	2.1	2.1
Phosphorus				
Ortho, ppm	0.03	<0.01	<0.01	<0.01
Total, ppm	0.03	<0.02	<0.02	<0.02
Mercury (Hg), pp mb	<0.5	<0.5	<0.5	<0.5
Lead (Pb), pp mb	<5	<5	<5	<5
Zinc (Zn), ppb	65	70	10	<5
Arsenic (As), ppb	<2	<2	<2	<2
Cadmium (Cd), ppb	<1	<1	<1	<1
Chromium (Cr), ppb	4	2	<2	5
Copper (Cu), ppb	5	1	<1	<1
Nickel (Ni), ppb	15	12	13	14
Silver (Ag), ppb	<2	<2	<2	<2
Vanadium (V), ppb	<20	<20	<20	<20
Total PCB, ppb	<0.1	<0.1	<0.1	<0.1
Total DDT, ppb	<0.1	<0.1	<0.1	<0.1
Maganese, ppb	17	66	125	88

n

Table 11
East Port Basin
Extraction Procedure Toxicity Test Results

<u>Substance</u>	<u>Maximum Concentrations EP Toxicity Regulations*</u>	<u>Sample Locations</u>					
		<u>FD-2(A)</u>	<u>FD-4(B)</u>	<u>FD-5(C)</u>	<u>D</u>	<u>E</u>	<u>F</u>
Endrin, ppb	20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Lindane, ppb	400	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Methoxychlor, ppb	10,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toxaphene, ppb	500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-D, ppm	10	0.02	0.02	0.02	0.02	0.02	0.02
Silvex, ppm	1	0.02	0.02	0.02	0.02	0.02	0.02
✓ Mercury, ppm	0.02 0.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver, ppm	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic, ppm	5	0.01	0.002	<0.002	0.007	0.02	0.002
Barium, ppm	100	3.10	2.10	2.10	1.75	4.75	15.00
Cadmium, ppm	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium, ppm	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead, ppm	5	<0.1	0.04	0.01	0.01	<0.1	<0.1
Selenium, ppm	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

*Federal Register, Monday 19 May 1980, 40 CFR 261.24

46A

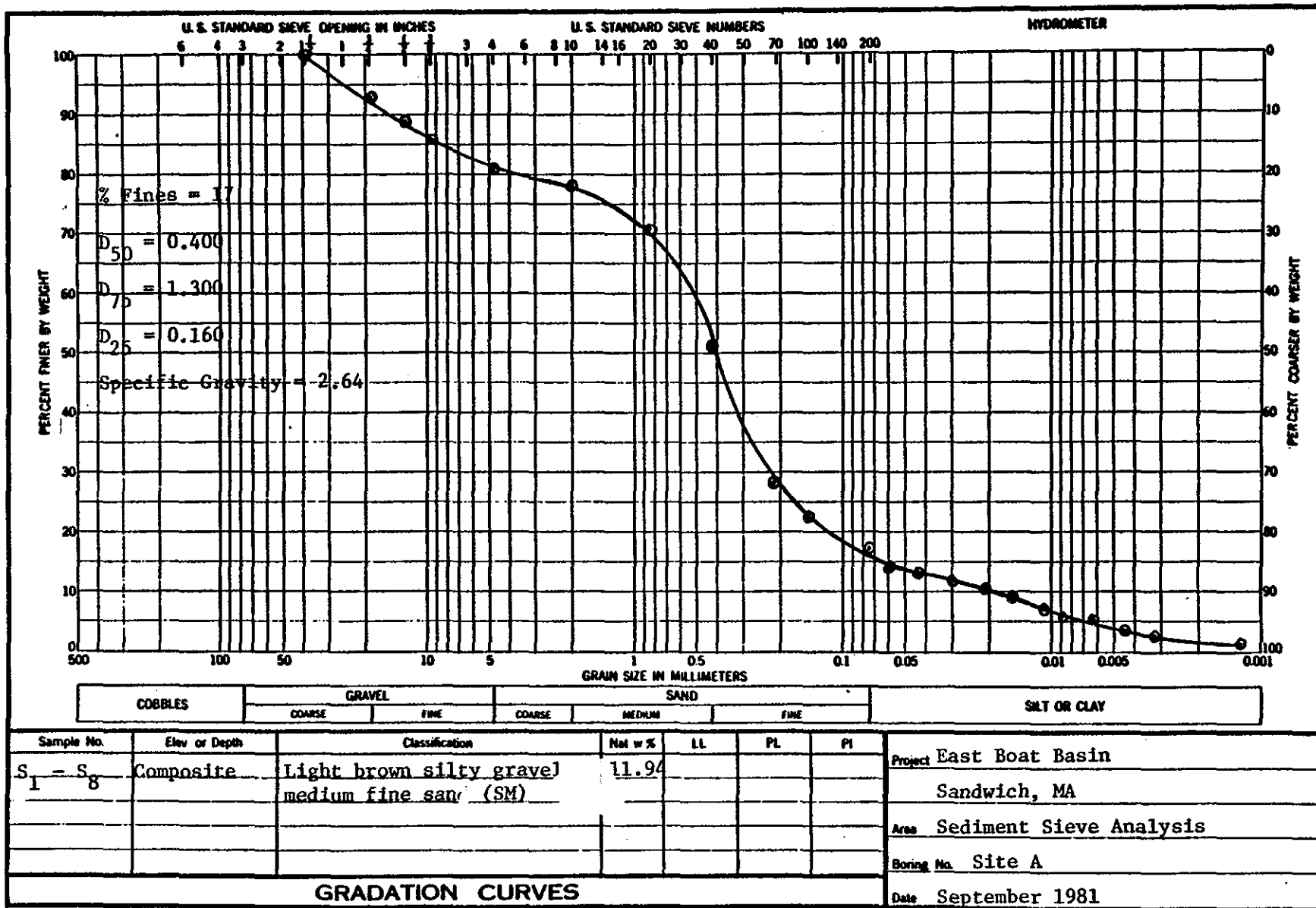
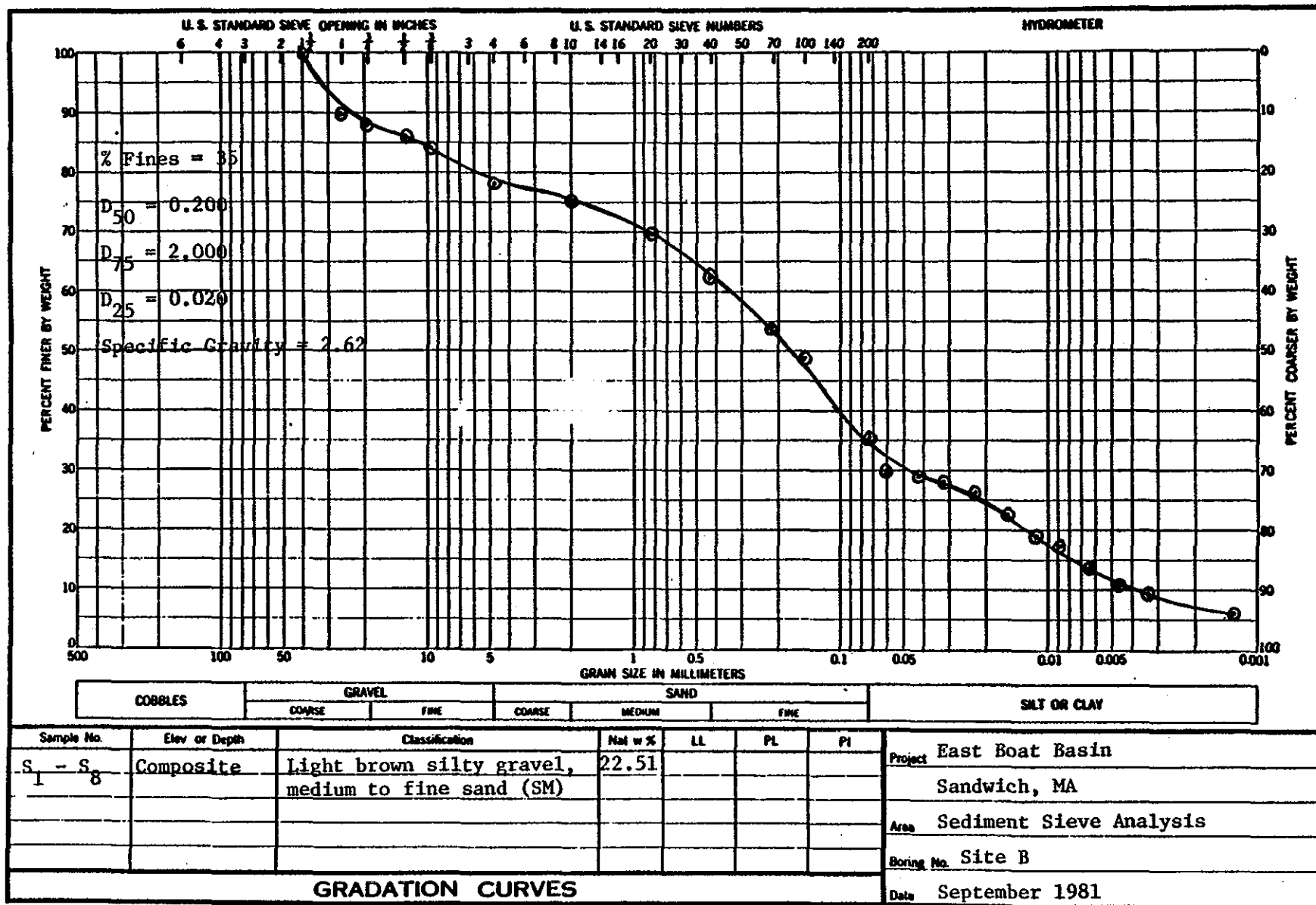


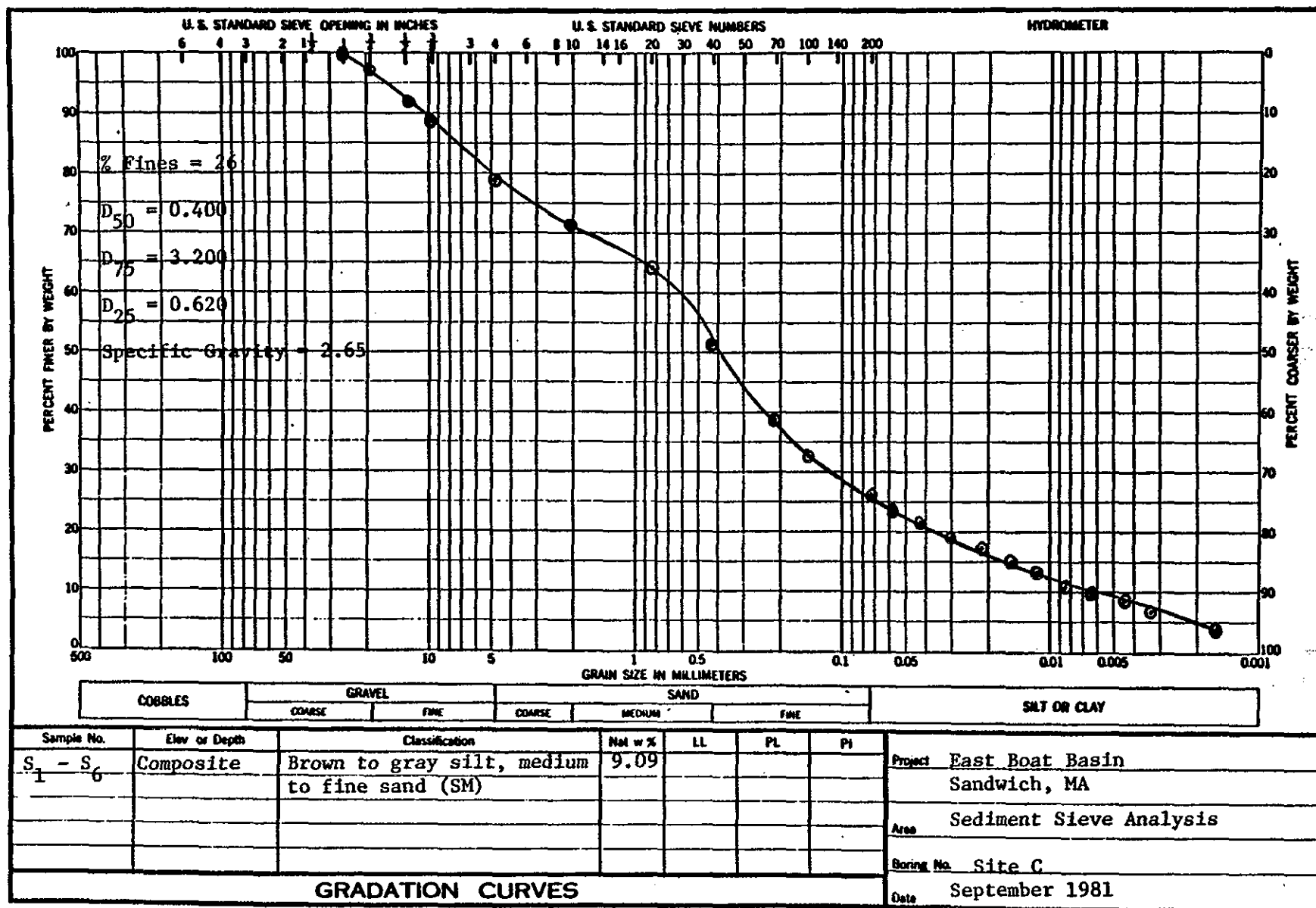
FIGURE 5

406

FIGURE 6

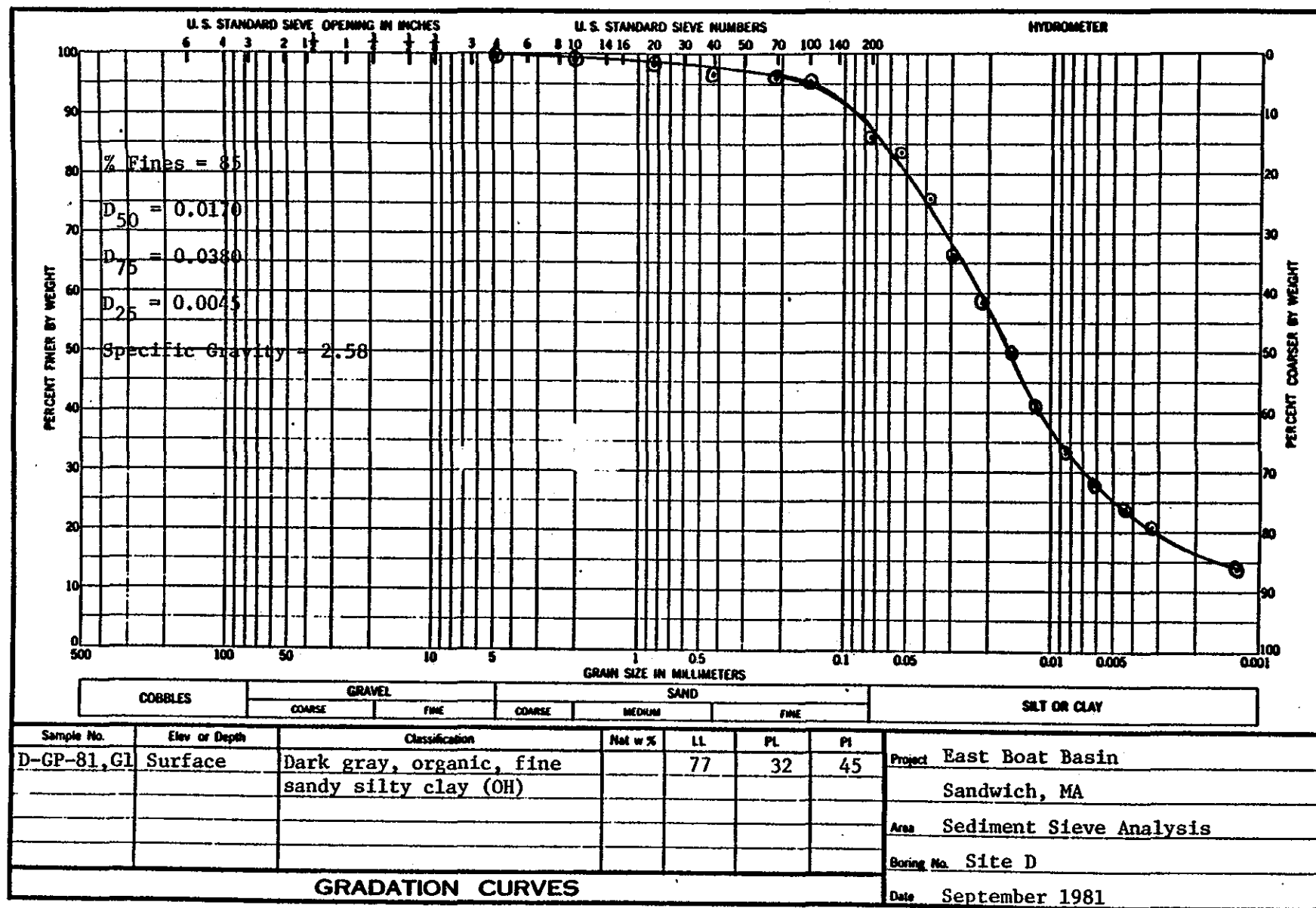


40c



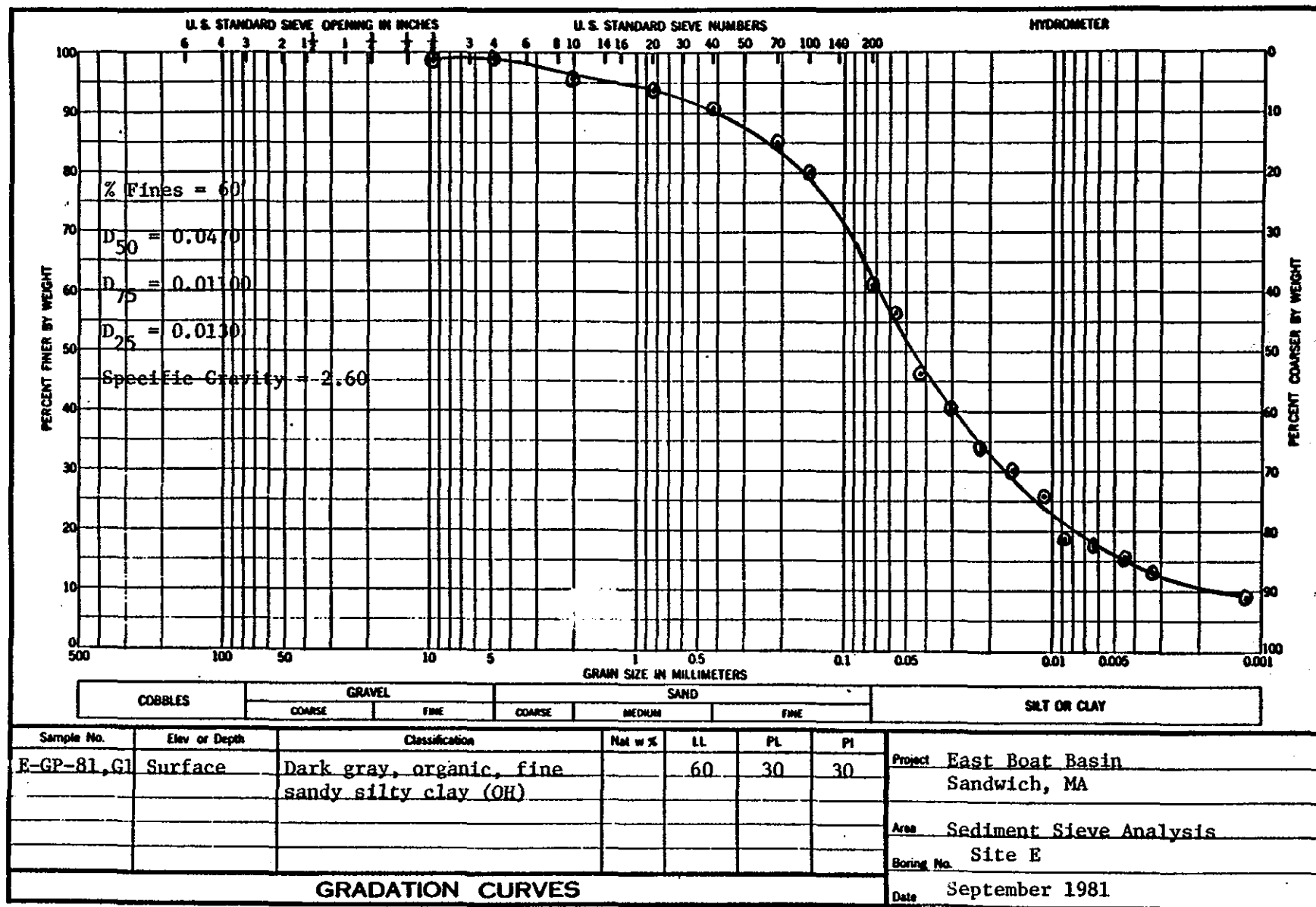
405

FIGURE 8



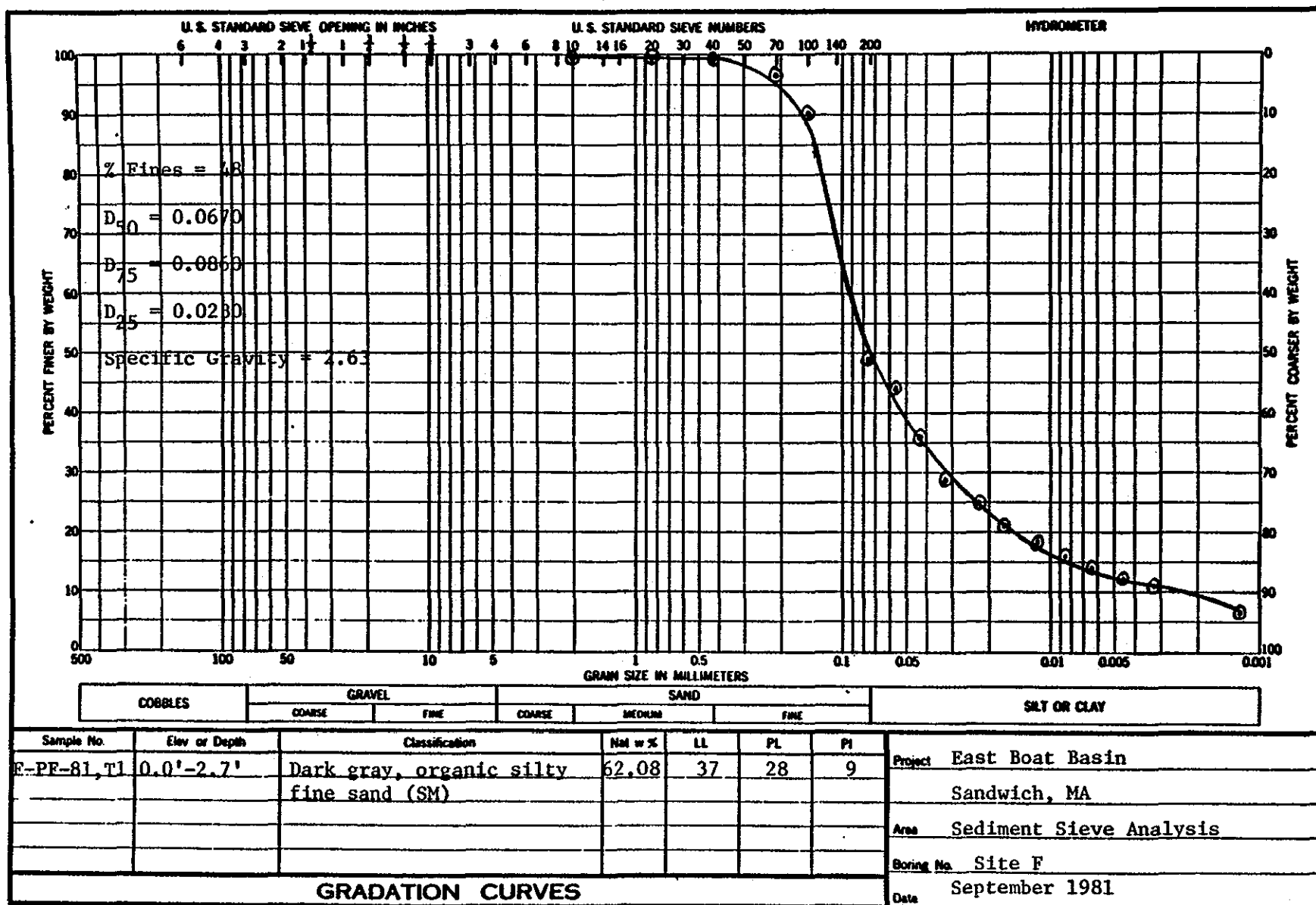
40E

FIGURE 9



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FIGURE 10



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waste. Based on these test results no significant environmental problems would be expected to occur with land or open-water disposal of the material.

Part 227.13(b) of the ocean dumping ^{criteria} identifies certain dredge materials that may be excluded from further testing (bioassays) and allows the material to be considered environmentally acceptable for ocean dumping in the following instances:

1. Dredged material which is composed predominantly of sand, gravel, rock, or any other naturally occurring bottom material with particle sizes larger than silt, and the material is found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels; or

2. Dredged material which is for beach nourishment or restoration and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches; or

3. When: (1) the material proposed for dumping is substantially the same as the substrate at the proposed disposal site; and

← line up with (i)

(ii) the site from which the material proposed for dumping is to be taken is far removed from known existing and historical sources of pollution so as to provide reasonable assurance that such material has

not been contaminated by such pollution.

The material to be removed from the ~~East~~^b ~~Boat~~^b Basin area has been tested and is considered to be uncontaminated and in compliance with the above exclusion criteria. The ~~availability~~^{existence} of point source discharges, including petroleum spills in the basin area, have been investigated (personal communications with the U.S. Coast Guard and Mass. Dept. of Water Pollution Control, May 1983). No spills of any significance have been reported since the ~~sediment~~^s samples were taken. Point source discharges in the basin constitute primarily thermal discharges. No major point sources are known to exist in the basin area. Fish processing plants in the area discharge effluents solely into the canal waters. These are quickly diluted by strong currents. The remainder of facilities around the basin utilize ~~ground~~^{leachate} bed systems which filter effluents before they enter any waterbodies in the area.

EPA has informed us, by letter of 22 October 1982, that they consider the material to be removed from the East Boat Basin project to be suitable for ocean disposal.

Based on the above information and review of applicable criteria we feel that the material to be dredged and excavated from this project is within compliance and is environmentally acceptable for disposal at the Foul Area.

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2. The Action of Disposal - The dredged material is released through bottom opening doors in the scows and deposited at the dump site. The movement of sediments through the water column has been extensively investigated. Immediately upon release from the scow the material generally descends rapidly to the bottom. The speed of descent and the size of bottom spreading depends on many factors, including the mechanical properties of the sediment, water content in the sediments, depth, bottom conditions, and ambient currents. Ambient current conditions are important since a large volume of disposal site water is involved during descent such that the material flow may acquire the ambient lateral velocity of the water. Upon impact, a turbidity (density driven) current could result which would spread outward until frictional forces cause it to stop. However, ^{a majority of} the East Boat Basin material is expected to descend rapidly to the bottom with minimal bottom spread due to its coarse nature.

3. Impact on the Environment -

a. Water Quality - The only impacts on the water quality associated with the dredged material disposal could be a temporary and local increase in suspended solids and release of contaminants.

i. Turbidity - Release of the dredged material could introduce a turbidity plume of fine loose and clumped material into the water column. Studies performed during a disposal operation at the Foul

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Area by the New England Aquarium (1975) indicated that suspended solids were highest near the bottom of the water column. However, the levels of turbidity did not adversely affect primary production. Observations to date indicate that generally only 1-5% of the total volume of dredged material dumped in open water remain suspended in the water column after disposal. Since very little fine material will be associated with the ✓ East Boat Basin project, any turbidity generated by disposal should be ✓ localized ~~of~~ ^{at} the immediate discharge area and be of short duration. There should be no measurable effects outside ^{the} ~~the~~ dumpsite area.

ii. Release of Contaminants - The material dredged and excavated from the project area and disposed at the Foul Area may result in some release of certain constituents to the water column during descent. Some release may also occur from the material after settling to the bottom. However, bulk chemical analyses ^e on the material show it to contain relatively low levels of constituents of concern. Additionally, elutriate analyses on material from Site E within the basin shows only ammonia, oil and grease and manganese [↔] to have a potential for release above ambient water concentrations within the basin. The values that do show release above ambient levels are well below EPA's water quality standards and should pose no significantly adverse effects on the marine environment. Mixing through the water column and by current flow at the dumpsite will dilute any releases and further reduce any contaminant concentrations to negligible levels.

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b. Sediment Quality - As previously described, the sediments to be discharged at the Foul Area by this project have been tested and found to be predominantly coarse grained and uncontaminated. The site has been used for many years for disposal of large amounts of finer and more contaminated material. This has resulted in an increase in contaminants at the dumpsite, which has resulted in a degradation of sediment quality compared to other nearby areas that have not been used for disposal. The uncontaminated nature of the East Boat Basin material could actually improve the dumpsite sediment quality by covering more contaminated material already at the site. At worst, bottom conditions could remain the same.

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c. Impacts on Organisms —

1. Physical Effects —

Turbidity - Any increased levels of suspended particulates during disposal operations will be minor, localized and short lived. The impacts of disposal on phytoplankton were monitored at the Foul Area during disposal operations in 1973 (Martin and Yentsch, 1973). The authors found no evidence to suggest that the natural seasonal fluctuations of phytoplankton were disturbed. The effects of turbidity on pelagic fishes at the time of disposal should be inconsequential since they would be able to easily avoid any temporary turbidity plumes. Polychaete worms, which have been found to constitute a majority of the

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benthic organisms at the dumpsite are deposit feeders commonly associated with fine sediments. Their feeding activity results in a reworking of the sediments producing a layer of surface sediment that is easily resuspended by low velocity currents (Rhoads and Young, 1970). By this nature, these organisms normally live in extended periods of turbidity and should not be significantly affected by additional minor turbidity of short duration.


It is expected that filter feeding organisms such as bivalve molluscs would be more sensitive to increased suspended solids because of the nature of their feeding and respiratory mechanisms. However, review of available literature indicates that bivalves exhibit low mortality when exposed to increased suspended solids from dredging operations (Stern and Stickle, 1977). In addition, a report prepared for the Massachusetts Department of Natural Resources (1973) found filter feeders such as quahogs, soft-shelled clams and Atlantic oysters were not affected by 48- and 96-hour sediment concentrations of 83.2 grams per liter. These values simulate the effects of the worst case turbidity from dredging activities. The fortitude of these organisms can also be applied to turbidity at disposal sites. ~~it is concluded that~~ Therefore, ^{it is concluded that} significant harm to filter feeders at the Foul Area is not likely to occur.

← indent further

Sedimentation - Sediments discharged from the scows at the dumpsite will bury any benthic organisms living in the impact area. Deep-burrowing sediment feeding organisms will have a better chance of survival than non-motile or slow-moving epibenthic species. Burying of

the more sensitive eggs, larvae and juvenile forms would probably result in death. Large motile forms such as fish, crabs or lobster would have a better chance of survival. Recolonization by smaller shortlived pioneering species would occur soon after disposal. Rhoads, et al.^a (1978) and McCall (1977) have shown that successions of benthic communities would follow until a climax community of longer-lived larger species ^abecome established. This could occur provided that the site were not disposed on again within a few years. Once established, the tubes of many recolonized invertebrates ^{serve to}would stabilize the bottom surface. Complete recovery of benthic productivity, if it occurs at all, would be difficult to predict but could occur in from 1.5 years (U.S. Navy, 1979) to 11 years (as calculated by Saila, 1973) provided subsequent dumping did not occur. Complete recovery would probably not occur at the Foul Area, however, since it is a designated dump site and would be expected to remain in continuous use indefinitely.

11. Chemical Effects - The ocean dumping criteria described previously are intended to insure that no significant undesirable effects will occur beyond the disposal area limits. The granular, uncontaminated nature of the East Boat Basin material enables us to consider it to be environmentally acceptable for ocean disposal without further testing. This precludes the necessity for bioassay/bioaccumulation analyses. Since the material exhibits low concentrations of chemical contaminant constituents^{ents}, its disposal at the Foul Area should not produce any measurable negative chemical effects on any marine biota.

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d. Threatened and Endangered Species - The humpback and finback whales are present in the Stellwagen Basin area during the late spring, summer, and early fall months. Based on the maximum June and July densities of these species recorded for ^{the outer Massachusetts Bay area} (1979 data from URI, 1981 and 1981 data from Mason Weinrich), the expected density of individuals within a 2 nautical mile radius (12.5 nm^2 or 43 km^2) of the Foul Area discharge buoy would be 0.73-1.25 individuals for each species in June and July. This assumes an equal distribution of animals throughout the bay area which is ^{no actual sightings were made within a 2 nm. radius of the discharge buoy in the above data collection efforts (see Section II.B.4).} not actually the case. Nevertheless, we can assume as the worst case that one or two individuals may be present within the 12.5 nm^2 dumpsite area. ^{during the summer}

work
Section IV of this report notes that the project may take about two years to complete. It is estimated that there will be a maximum of two scow trips per day to the dumpsite during this period. However, it is expected that dredging and excavation will be limited during the summer months because of increased recreational boating in the canal area during that time. Consequently, there should be very limited disposal activity at the Foul Area during the greatest whale activity in the vicinity. At most, it is estimated that any disposal activity concurrent with the period of whale activity would be on the order of about 5-10 minutes/day. This would result in a low probability of encounter with minimal impact to feeding individuals in the area.

The increased boat traffic in the area would slightly increase the chance of collision with "logging" whales at the surface. However, several

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of the preferred areas - Jeffrey's Ledge, Stellwagen Bank, the Provincetown Slope, and Great South Channel in particular - lie directly in the main shipping lanes to Boston, Massachusetts and other Gulf of Maine seaports. The fact that the animals continue to concentrate on these feeding banks, and utilize these migration routes in spite of the present high level of vessel traffic, supports the theory that feeding and migrating whales do not exhibit significant avoidance behavior to general ship traffic. Therefore, any increase in such traffic due to disposal is unlikely to affect significantly the species using these areas, especially since ^{the scows} ~~we~~ will not be transiting through the bank area but only to a point of the west and then turning and returning to ~~the~~ port. ✓
✓
✓
✓
✓
✓
✓

If by chance a whale is dumped on during disposal activities, the effects on that individual ^o ~~would~~ be unknown. No studies have been ^o ~~concerned~~ with the effects of ~~suspended~~ dredged material ^{disposal} on whales. The University of Guelph, Ontario, is preparing to ^o ~~conduct~~ experiments on the effects of petroleum and drill cuttings on the integument of dolphins for the Bureau of Land Management. The studies have not yet begun and would have little applicability to the effects of dredged material (David St. Aubin, personal communication). ✓
✓
✓

There is some concern about the possibility of impacts on the food species of ^{the} ~~the~~ endangered species. Humpbacks, and to a certain extent finback whales, feed on the sand lance (Ammodytes americanus) which have ^s ~~have~~ markedly increased in numbers in the bank area since 1975 (Meyer, et al.,
1279) ✓
✓
✓
✓

1979).

Impacts to the sand lance may be broken down to the three aspects of their life activities: (1) daily activities in terms of schooling and burrowing, (2) their food ^ssource, and (3) reproductive habitat.

Most of the daily activities of the sand lance involve either swimming in schools or burrowing in suitable substrate. Impacts to their natural schooling movements are likely to be short-term and localized. As mentioned above, the short time that disposal would actually take place (5-10 minutes per day) and the small affected area involved (0.05 nm^2 or approx. 0.0005% of Massachusetts Bay) would reduce the chances of encountering with a passing school. It is likely that the school would avoid the disposal induced disturbance and not be affected because of their high mobility.

The sand lance also spends a portion of its time burrowing in the sand. It has a marked preference for clean sand and fine gravel substrate (NMFS, personal communication). The entire Foul Area dump site ^{is} ~~sits~~ in a basin ~~which is~~ made up of primarily silty clay (anthropogenic and naturally occurring) with associated currents which average 4-5 cm/sec. This area of sediment accumulation is not considered ^{to be} ~~as~~ potential habitat for burrowing sand lance. The best habitat for such activity is on the Stellwagen Bank, east of the disposal site. Because of ^{the} ~~low~~ magnitude of the currents at the disposal site, the high magnitude of the currents on the Stellwagen Bank, and the 200 foot ridge east of the dump site that

isolates the site from the bank area, resuspension, movement^x and deposition of dredged material on the preferred burrowing habitat on the bank would be unlikely.

It is not expected that the sand lance would significantly accumulate sediment contaminants. Approximately 99% of the sediment is expected to settle to the bottom almost immediately. Elutriate tests on the sediment to be dredged show very little release of constituents of concern to the water column. Also, studies have shown that release of any contaminants during disposal is a short-term phenomenon^{menon} and that background levels would return soon after disposal (Wright, 1978¹; Burks & Engler, 1978). Due to[↔] the high mobility of schooling sand lance which might be in the vicinity of the area during or shortly after disposal and given the^{low} level[^] release expected, it is doubtful that any individuals would be sufficiently exposed to the affected area long enough for any significant accumulation to occur. Since it is unlikely that the sand lance would burrow in the deposited sediment, accumulation from the sediments would not be of concern.

Few studies on the reproductive habitat of^{the} sand lances[^] have been done. However, NMFS (personal communication) has indicated that the usual spawning substrate is clean sand or fine gravel in about 20 feet of water or less. The Foul Area offers no potential for such habitat and therefore little or no short-term impacts and no long-term impacts are expected on the sand lance population due to the proposed disposal activities.

Based on the above discussion, ^{it is} expected that the proposed disposal operations would have minor or no impact on the humpback or fin^{back} whales which may use the area. The dredged material disposal would be closely controlled and monitored to ^{Space is too big} insure accurate deposition. This historical disposal site is situated in a deep basin where relatively low bottom currents have made the area a long-term fine-sediment accretion zone. Once the material is deposited, the currents are not of sufficient magnitude to significantly disrupt the bottom. No impacts are expected on the preferred habitat of these species, located 3-4 nm ^{to the} east of the disposal site.

The size of the affected discharge area ^o would be about a 250 meter radius around the discharge buoy (0.05 square nm area). This is approximately 0.0005% of the total area o^o Massachusetts Bay available to the whales for feeding habitat. The density of whales (^{case} worst⁺) in the 12.5 nm² area ⁱⁿ which the discharge site is located ^{is} about one individual ^{pr} species. This represents about 0.16% of the total population of humpback and fin^{back} whales which use Massachusetts Bay. Thus, given (1) that the preferred Stellwagen Bank habitat for the whales and sand lance would not be affected, (2) the small size of the affected area, and (3) the small number of potentially affected individuals, minor or no impact to the population of the whales or prey species is expected.

← indent further

e. Historic and Archaeological Resources - As the material will be deposited in a previously used disposal site, no effect upon

significant historic or archaeological resources is anticipated.

VII. Alternatives to the Proposed Action

A. Development Alternatives

1. Original Alternatives and the Screening Process - The following development alternatives were identified during the progress of the study, and retained or rejected during the screening process, as described.

9.34 Transfer Commercial Fishing Fleet to Other Ports - ✓

Transfer of the local fishing fleet to other ports would provide additional berthing space, thereby allowing a doubling in the size of the recreational fleet. It would be a boon to the recreational boating activities in the area. However, the state of regional fishing ports would preclude the finding of space by the dislocated fishermen. All of the regional ports are saturated, overcrowded or lack adequate facilities, and therefore could not accommodate the Sandwich boats without problems. Two additional factors of importance are the reluctance of fishermen to move from their historic port, and the desire by the town of Sandwich to promote the fishing industry. Implementation of this alternative would be detrimental to the local and regional fishing industry, and would be inconsistent with local plans. This alternative was therefore dropped from further consideration.

b. ~~2~~. Transfer Recreational Boats to Other Ports - Movement of recreational boats to other ports would permit ^{smaller} fishing craft to use the entire basin, thereby substantially increasing the number of fishing vessels in the fleet. This alternative would provide some relief for the regional fishing industry, by taking vessels from crowded ports. Although the possibility of implementing this alternative, from a space available point of view, is better than that of transferring fishing boats out of the basin, it would preclude recreational boating opportunities for a large area. The East Boat Basin provides the only access point to Cape Cod Bay anywhere near the east end of the Cape Cod Canal. There are presently 116 recreational boat owners on the active waiting list for berthing space, indicating the level of demand for this activity. In addition, the basin is used by a large number of transient cruising sailboats for laying over. It would be extremely difficult to convince existing permanent and transient boaters, and those on the waiting list, to drive or sail to another port 10 to 20 miles away. Based on the need to retain recreational boating opportunities at the East Boat Basin, this alternative was dropped from further consideration.

c. ~~x~~. No Action ^{This} ~~Do Nothing~~ - ~~Doing nothing~~ would avoid any impacts associated with making structural improvements to the existing basin, and would save the cost of construction. However, it would not alleviate ~~any~~ of the existing problems or meet future needs. The economic attractiveness of the port would be limited, by disallowing the opportunity to capitalize on expansion of the commercial fishing industry and the

recreational boating activity. The regional^o fishing industry would also remain constrained because of the lack of adequate facilities. ~~Being~~ ^{The} ~~No Action alternative~~ ^{nothing} does not address any of the problems and concerns expressed by local interests, and was therefore eliminated from further study.

d/. Structural Improvements - The implementation of structural improvements would enable the East Boat Basin to accommodate a greater number of commercial fishing vessels and recreational boats. The opportunity would be provided to capitalize on future demands of these activities, including onland development. The incorporation of a more clearly defined navigation system would provide a better organization of basin activities than at present. The state of the regional fishing industry would be enhanced.

A range of preliminary structural plans was formulated to examine various degrees of improvement. They ranged from a primarily nonstructural plan that considered the possibility of maximizing use of the existing basin, to a number of plans examining various degrees of basin expansion. The primary criteria for screening the preliminary alternative structural plans was their contribution to National Economic Development (NED), and acceptability of plans to local interests. Structural improvements were determined^m to be the most satisfactory means of addressing the problems and meeting the needs of the commercial fishing and recreational boating activities. Therefore, four structural alternatives were carried forward for further study.

2. Surviving Alternatives - The four alternatives carried forward for detailed study were structural Plans A, B, C, and D. All of the plans are essentially the same in that excavation of a landcut is proposed to expand the basin. The plans differ only in perimeter configuration and location of plan features. All plans propose the same plan features including a 14-foot deep entrance channel, a 14-foot deep turning/maneuvering area, a 12-foot deep commercial berthing area, an 8-foot deep recreational berthing area and a 14-foot deep offloading area. All plans propose the use of riprap slope protection for the basin perimeter, except in and around offloading areas where bulkhead^{ing} is proposed. The differences in feature location and size are detailed below.

← bring indent to here
a. Plan A - Plan A (see Figure 11)

provides a rectangular expansion area extending south about 600 feet parallel to Gallo Road. The expansion would increase water area by 7.8 acres, while taking up a total area of 9.4 acres when riprap slope area is included.

The 120-foot wide entrance channel skews right into the expansion separating the commercial and recreational berthing areas. The channel would terminate at a 160-foot by 440-foot turning/maneuvering area at the rear of the basin. Adjacent to this area along the shoreline would be fish offloading areas. The expansion would provide increases of 1.4 acres and 3.3 acres in recreational berthing and commercial berthing areas, respectively.

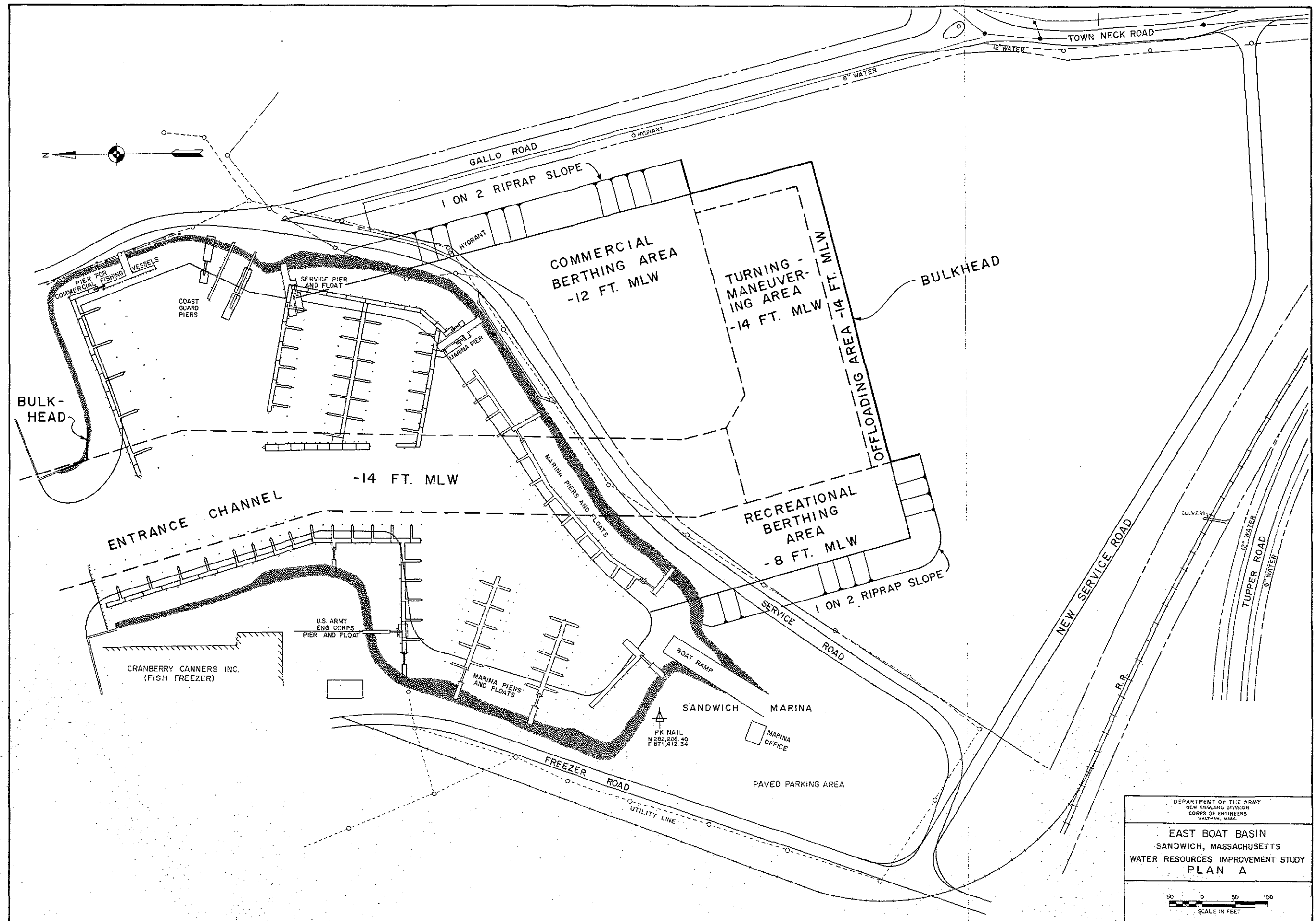




FIGURE 11

 b. Plan B - Plan B (see Figure ¹²4) provides a different basin expansion configuration than the previous plan. The major difference is in the location of fish offloading areas, which would be near the center of the expanded basin along the east side. A sizeable peninsula for location of offloading facilities would extend about halfway into the basin. The entrance channel, following the same alignment as the previous plan and abutting the offloading peninsula, would terminate at a 160-foot by 420-foot turning/maneuvering area located behind the peninsula. This area would provide access to the commercial and recreational berthing areas located further inside the basin. ✓

The total increase in water area would be 9.7 acres, resulting in a total expansion of 12.4 acres including area requirements for riprap slope. Plan B would provide expanded recreational berthing of 2.3 acres and commercial berthing of 4.3 acres.

 c. Plan C - Plan C (see Figure 2) is the same as Plan A except that the expansion area extends about 150 feet farther back than Plan A. The increase in water area would be 9.9 acres, with a total area of 12.0 ac^e_A taken up, including riprap slope. ✓

The entrance channel alignment and turning/maneuvering area are identical to those in Plan A. However, recreational berthing and commercial berthing areas will be greater with areas of 1.8 acres and 4.5 acres, respectively. ✓

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d/. Plan D - This plan (see Figure 5) is similar to Plan B with respect to the location of offloading facilities. However, the offloading area extends along the side of the basin, rather than extending into the basin. The increase in water area would be 9.8 acres, with a total expansion of 12.7 acres including riprap slope area. Areas of 2.8 acres and 4.6 acres would be provided for recreational berthing and commercial berthing, respectively, in the expansion area.

The entrance channel alignment would be different, swinging left and then abutting the offloading area. The channel would terminate at a 160-foot by 230-foot turning/maneuvering area. This area would provide access to the commercial berthing area farther into the basin. The recreational berthing area would be located adjacent to and west of the entrance channel.

←

3. Final Selection - Selection of a recommended plan of improvement was primarily based on the net economic benefits criteria. Comparison and evaluation of detailed plans found that Plan C contributed the greatest towards the National Economic Development account, and therefore it is the selected plan of improvement.

B. Disposal Alternatives Two modes of disposal were considered, open-water disposal and upland disposal. Whereas the traditional method of disposing navigation project material has been in open-waters, it was recognized that the quantity and quality of material provided an

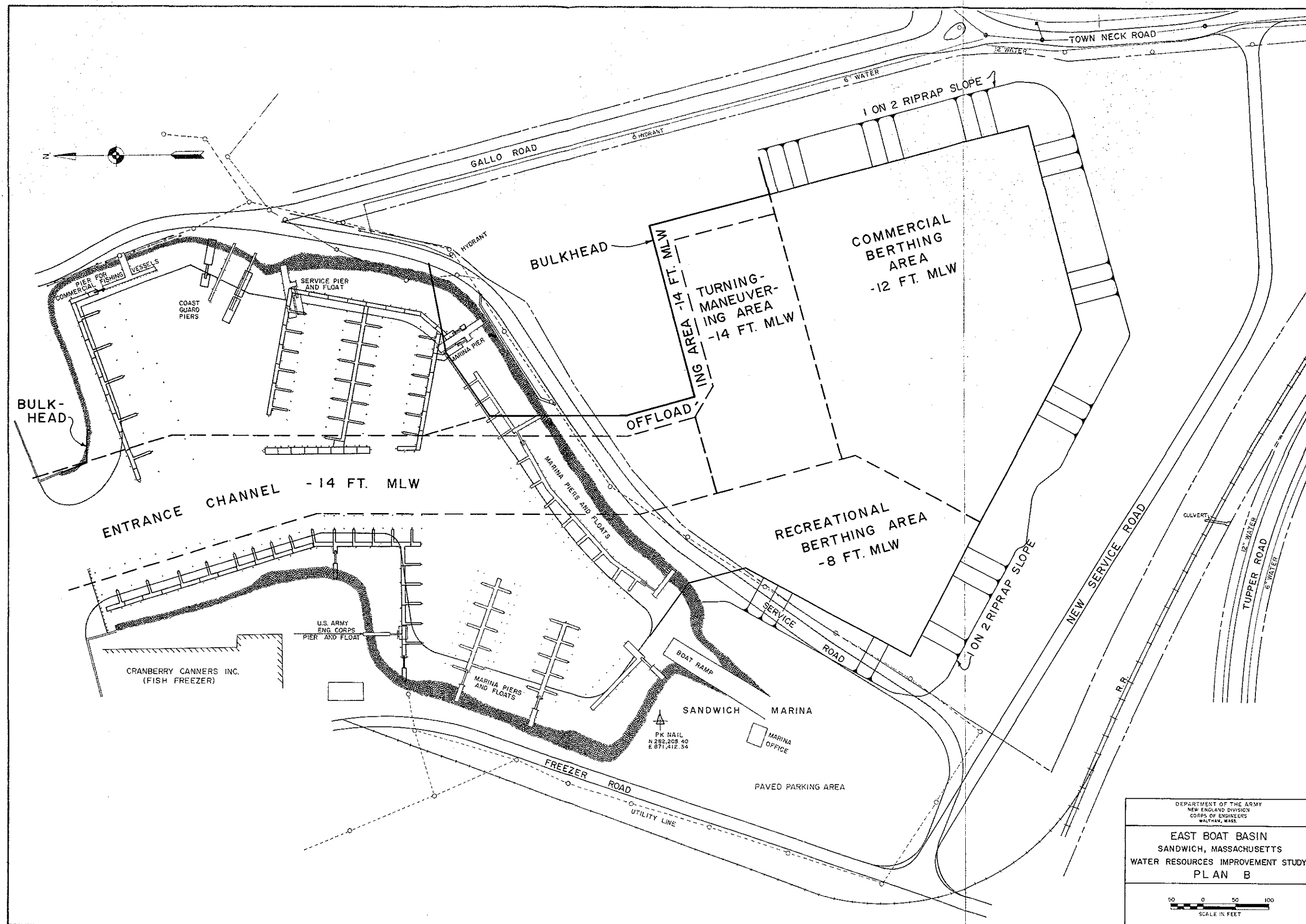


FIGURE 12

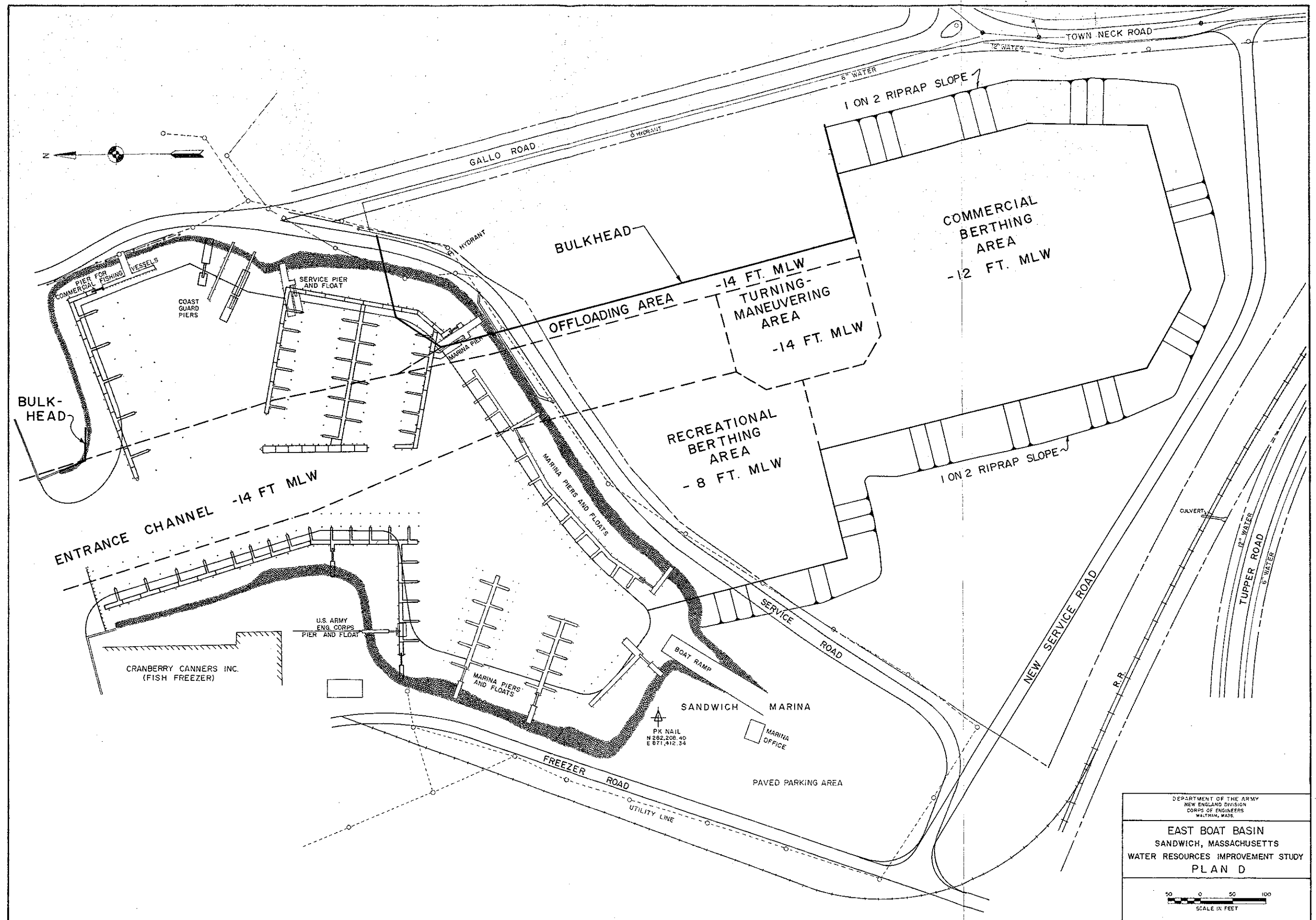


FIGURE 13

opportunity for beneficial upland use. Upland disposal was the preferred disposal option; however, economic and institutional constraints led to the selection of the open-water site at the Foul Area.

1. The Original Alternatives - Coordination during the early phases of the study with local interests and the U.S. Fish and Wildlife Service identified a number of potential upland sites within the region. Also, two open-water disposal options were retained for investigation. The upland disposal site locations are indicated on Figure 14, and all identified options are discussed below.

1. Town of Sandwich, Sanitary Landfill - The sanitary landfill is located along the east side of Route 130 about one mile north of the town center. Some, but far from all, of the project material could have been trucked from the East Boat Basin for use as cover material at the landfill.

2. Depression North of the Sandwich Sanitary Landfill - This area, immediately adjacent to the present landfill area is a large forested bowl with steep slopes. The north side of the bowl consists of a ridge overlooking Cape Cod Bay that has a private residence located on top with access from Route 130. Ownership of the depression is divided between the town of Sandwich and the ridgetop resident, with the boundary running through the bottom of the depression. A small wetland area is also located at the bottom. A rough capacity estimate indicated that

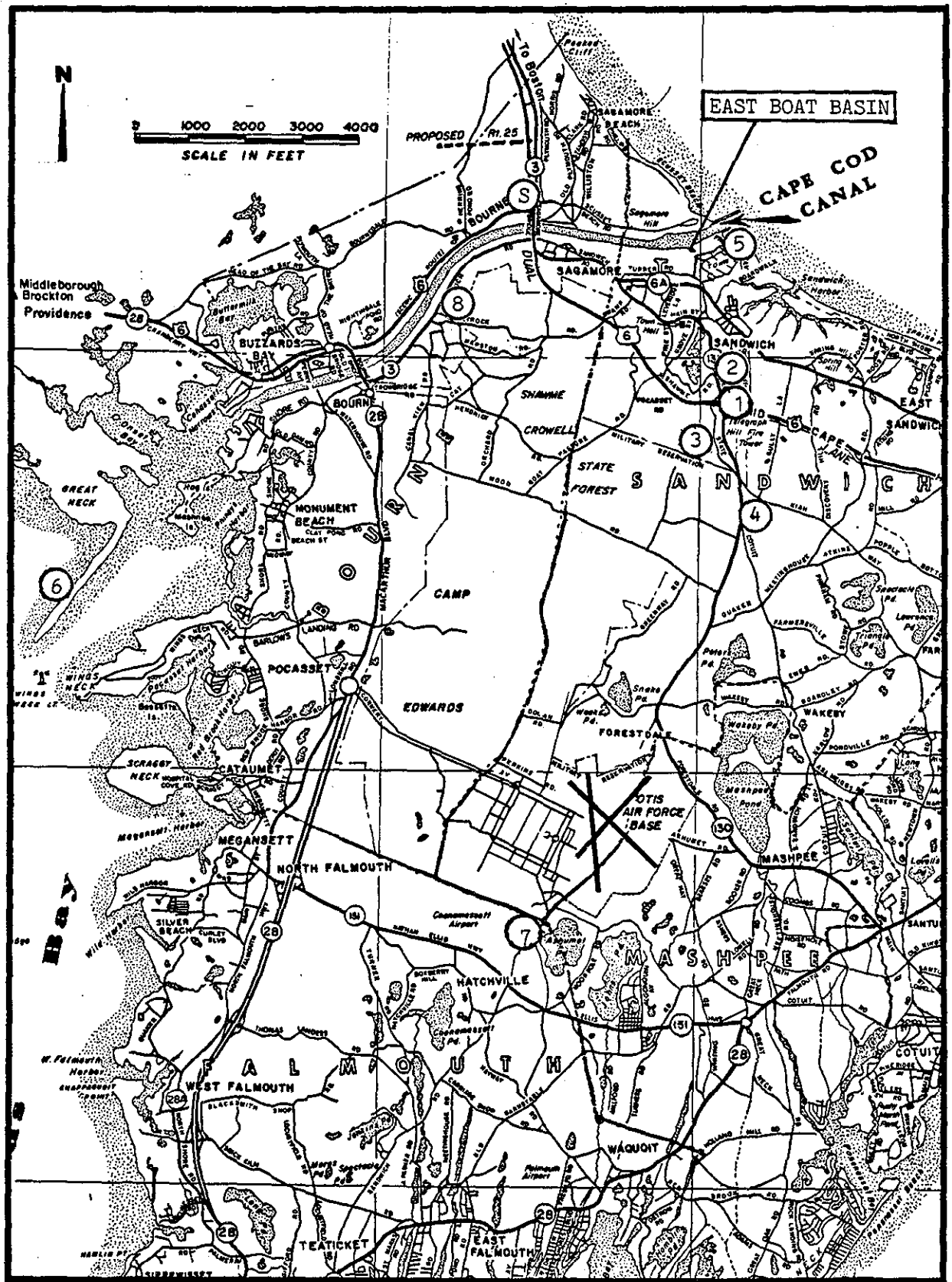


FIGURE 14 - Upland Disposal Site Locations

about 300,000 cubic yards of material ^ould have been placed in the depression. ✓

3. Camp Edwards Military Reservation - Camp Edwards Military Reservation abuts the town of Sandwich to the southwest. A large valley-like area is located on the east side of the reservation just south of the Mid-Cape Highway and Route 130 interchange. Access to this area is available from Route 130. This forested area would easily have been able to contain all material generated by the project. ✓

4. ^{on} Stump Dump and Route 130 - A privately owned stump dump and gravel pit area ^out one mile south of the sanitary landfill along Route 130 was considered. The project ^saterial would have been stockpiled and used for ^yoer material in the disposal of tree stumps. ✓✓✓

5. Sandwich Town Neck Beach - This beach, located south of the eastern Cape Cod Canal entrance has lost much of its material due to hydrodynamic processes. The possibility was explored to place suitable project material on the beach, which is just over a half-mile away from the East Boat Basin. ✓

6. Stony Point Dike, Wareham - This disposal alternative was identified by the U.S. Fish and Wildlife Service. The Stony Point Dike is located in Buzzards Bay about 10 miles to the southwest of the basin. All of the material would have been placed on the inland side of

4. Stump Pump and Route 130 - A privately owned stump pump and gravel pit area about one mile south of the sanitary landfill along Route 130 was considered. The project material would have been stockpiled and used for cover material in the disposal of tree stumps.

5. Sandwich Town Neck Beach - This beach, located south of the eastern Cape Cod Canal entrance has lost much of its material due to hydrodynamic processes. The possibility was explored to place suitable project material on the beach, which is just over a half-mile away from the East Boat Basin.

6. Stony Point Dike, Buzzards Bay - This disposal alternative was identified by the U.S. Fish and Wildlife Service. The Stony Point Dike is located in Buzzards Bay about 10 miles to the southwest of the East Boat Basin. All of the material would have been placed on the inland side of the dike for creation of tidal flat or saltmarsh.

7. Crane Wildlife Management Area - This disposal alternative was also identified by the U.S. Fish and Wildlife Service. This area is located south of Otis Air Force Base, about 17 miles from the East Boat Basin. Project material would have been deposited at a gravel pit located in the management area.

8. Corps of Engineers Gravel Pit at Canal Midway Station - This site was also identified by the U.S. Fish and Wildlife Service, as a

potential site for a public demonstration of habitat restoration using project material. Material would have been placed at the gravel pit which is about four miles from the basin, and new habitat developed on top of it.

9. Disposal in "404" Waters - Environmental test data indicates that the material is satisfactory for disposal into "404" waters, or coastal waters located landward of the territorial sea baseline. Project material would have been barged to a disposal site in either Cape Cod Bay or Buzzards Bay.

10. Ocean Disposal - The selected disposal option, analyzed in detail in Sections V and VI of this Environmental Assessment, involves the use of the Foul Area ^{ocean disposal} ~~open water~~ site in Massachusetts Bay.

2. The Screening Process - preliminary screening process was performed to narrow the range of disposal alternatives. State and Federal resource agencies were coordinated with, and provide their viewpoints concerning suitability of disposal options.


The following resource and regulatory agencies provided the comments summarized on Table 12. The actual letters from the agencies are contained in Appendix A.

Federal Agencies

1. USFWS - U.S. Fish and Wildlife Service
2. EPA - Environmental Protection Agency
3. NMFS - National Marine Fisheries Service

State Agencies

1. DEQE - Department of Environmental Quality Engineering
 - a. DWPC - Division of Water Pollution Control
 - b. DWP - Division of Wetland Protection
2. CZM - Coastal Zone Management

One additional disposal alternative was identified through coordination with the National Marine Fisheries Service in response to the requests for comments on the identified disposal options. A Sagamore businessman owns several low areas in the vicinity of the traffic rotary north of the Sagamore Bridge. He is looking for fill material at no cost to himself. Material from the East Boat Basin would have been trucked to these sites across the Sagamore Bridge. This became the eleventh disposal option, and is identified by the letter "S" on Figure 3. 

Based on the agency comments, and additional information coming to light during the progress of the study, the range of disposal options was narrowed in order to retain the most viable options. Rationale for retention or elimination of each disposal option is discussed below:

And Regulatory
Table 12
Resource Agency Comments on Disposal Options

<u>Disposal Options</u>	<u>USFWS</u>	<u>DEQE</u> <u>-DMPC</u>	<u>EPA</u>	<u>CZM</u>	<u>NMFS</u>	<u>DEQE</u> <u>-DWP</u>
✓ 1. Sanitary Landfill →	No comment	No comment	No comment	No comment	Investigate further.	Good potential disposal site. Would not impact public water supply.
✓ 2. Depression	Destruction of forest habitat.	No comment	No comment	Negative environmental impact.	No comment	Good potential disposal site. Would not impact public water supply.
✓ 3. Camp Edwards	Destruction of forest habitat.	No comment	Investigate further. Limited environmental impact.	Evaluate further. Little environmental benefit. Minimal environmental impact.	Investigate further.	Questionable. May be upgradient of town's gravel packed well.
4. Stump Dump	Potential for habitat mitigation.	No comment	No comment	No comment	Investigate further.	Questionable. May be upgradient of town's gravel packed well.
5. Town Neck Beach	No comment	Use for beach nourishment.	Investigate further.	Negative environmental impact.	No comment	Sediments do not appear to be of appropriate grain size distribution.
✓ 6. Stony Point Dike	First choice. Tidal flat or saltmarsh creation. Habitat replacement.	No comment	Create tidal saltmarsh. Environmental benefit. Habitat mitigation.	Marsh creation preferred priority. Environmental benefit.	No comment	Acceptable alternative. Must result in beneficial habitat creation to warrant serious consideration.
✓ 7. Crane Wildlife Management Area - } Gravel Pit →	Low priority, dedicated to conservation and wildlife management.	No comment	No comment	Precludes existing use.	No comment	Inappropriate for disposal of marine sediments. Potential chloride contamination of freshwater system.
8. Corps of Engineers Gravel Pit →	Potential for public demonstration of habitat restoration.	No comment	No comment	Precludes existing use.	No comment	Best upland site. Minimal impact on groundwater.
✓ 9. "404" water	No comment	Material approvable for disposal into Commonwealth waters.	No comment	Disposal in Cape Cod Bay not likely at present. NEPA RIR to be completed first.	Negative impact to inshore fishery resource.	May be appropriate. Further sediment testing required. if
10. Ocean Disposal	Object if disposal criteria not met. Requires bio-analytical, recommended biological testing.	No comment	Acceptable for ocean disposal.	Potential alternative subject to bio-analytical results. ocean dumping criteria.	Preferred over near shore disposal. Less desirable than upland disposal. Possible cap for Foul Area.	Probably not feasible due to cost of transporting to Foul Area. Additional testing necessary.

← indent to here

1. Town of Sandwich, Sanitary Landfill - This disposal option is not viable since the time frame of the expansion project would not coincide with the need for cover material. As discussed with the Town Engineer, the landfill would be approaching its maximum capacity and could only take a small amount of material. Therefore, this disposal option was dropped from further consideration.

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2. Depression North of the Sandwich Sanitary Landfill - The Town Engineer contacted the owner of the property abutting the town's property, regarding disposal of project material at this location. A negative response was indicated, which would cause difficulty in securing the site. In addition, resource agencies expressed some concern over potential negative environmental impacts. This site was eliminated from further consideration.

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to be

3. Camp Edwards Military Recreation - The Directorate of Facilities Engineering has indicated that the project material is acceptable for disposal at Camp Edwards. However, placing the material at the large valley-like area, previously identified, was indicated not incompatible with the future use of this area. A more likely scenario suggested by the Directorate, would be stockpiling of the material at several locations on Camp Edwards' property and using it as needed. Based on site availability, this disposal alternative was retained for further study.

U.S. Army
Camp Edwards

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4. Stump Dump on Route 130 - Discussions with the Town Engineer ←

indicated that the site will be developed into a soft drink production facility. Therefore, it was dropped from further consideration.

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5. Sandwich Town Neck Beach - No clear consensus by resource agencies was obtained concerning the viability of this disposal option. ✓

Based on gradation curve analyses, most of the material does not appear appropriate for beach nourishment. This disposal option was eliminated ←
from further consideration as the selected disposal option. However, the possibility exists for the town to take project material suitable for ←
beach nourishment during the construction process; for placement on Town ←
Neck Beach, at its own expense.

1 ← indent to here
6. Stony Point Dike, Wareham - Disposal of project material and ✓

creation of saltmarsh behind the Stony Point Dike appeared to be the most desirable disposal alternative from an environmental point of view, as expressed by a majority of State and Federal resource agencies. However, solicitation of local views regarding this disposal alternative resulted in vigorous opposition. Major concerns expressed by local interests included further siltation of the bay, ~~negative impact behind the Stony Point Dike appeared to be the most desirable disposal alternative from an environmental point of view, as expressed by a majority of State and Federal resource agencies. However, solicitation of local views regarding this disposal alternative resulted in vigorous opposition. Major concerns expressed by local interests included further siltation of the bay.~~ ←

negative impacts to the shellfish propagation program, damage to the dike which is a nesting and breeding ground for many birds, potential release of pollutants from project material, and damage to Wareham roads. Based on this local opposition, this disposal alternative was dropped from further consideration.

In addition to local opposition, cost was also a major consideration. The Stony Point dike was among disposal sites ^afurthest from the project site, thereby yielding a relatively high cost for transportation of the project material. The protective dike structure and marsh creation would incur substantial additional costs making this disposal alternative the most expensive of all.

16 ← indent to here
7. Crane Wildlife Management Area - The consensus of resource

agencies indicated that this site is not desirable for material disposal. In addition, this location is the ^{stok}farthest upland site from the East Boat Basin. The haul distance would substantially increase the cost of material disposal over other disposal alternatives. This disposal alternative was dropped from further consideration.

16 ← indent to here
8. Corps of Engineers Gravel Pit at Canal Midway Station -

Several resource agencies indicated that this site would be a good location for placing project material, since it would have the least impact on groundwater. However, discussions with the Corps of Engineers, Cape Cod Canal Office, have indicated that the gravel pit is actively used

to obtain bank run material for various purposes at the Cape Cod Canal project. Disposal of material at the gravel pit would preclude the existing use. Therefore, this disposal alternative was eliminated from further consideration.

^d
4. Disposal in "404" Waters - Three open-water disposal sites within "404" waters were considered, ~~including~~ the Wellfleet site about 7 nautical miles west of Wellfleet Harbor in Cape Cod Bay, the Cape Cod Canal site in Cape Cod Bay, located about four nautical miles northeast of the eastern end of the Cape Cod Canal, and the Buzzards Bay site just south of Cleveland Ledge.

Coastal Zone Management Agency
The Commonwealth of Massachusetts has indicated that disposal of project material in Cape Cod Bay would not be possible until after an Environmental Impact Report has been prepared under the Massachusetts Environmental Protection Act (MEPA) by the State MEPA Office, which will lead to formal designation of a Cape Cod Bay disposal site. This process is currently underway and may not be completed for several years. Based on ~~the State's preference~~ ^{this indication,} that no dumping will take place in Cape Cod Bay until studies have been completed, the Wellfleet site and Cape Cod Canal site were eliminated from further consideration. ~~for the present time~~ ^{designated} Should a Cape Cod Bay site be selected prior to construction, it would ~~be~~ ^{again} given consideration.

OK w/DB?
Disposal of the project material at the Buzzard's Bay site is not considered desirable. Disposal of the large volume (400,000 - 600,000 cubic yards) of project material would substantially raise the relatively

shallow (25' - 30') existing bottom elevation and pose a hindrance to navigation. Also, this site is presently the only active site available in the area, and dumping of ^{the} project material here would preclude its availability for the many ~~other~~ small projects that ^{are expected} ~~would plan~~ to use this location for disposal of dredged material. For the ^{above} reasons, the Buzzard's Bay ^{Site} was dropped from further consideration.

10. Ocean Disposal - All Federal resource agencies have

indicated that this alternative is acceptable. The U.S. Environmental Protection Agency has informed us that, based on available bulk sediment test results, the project material is considered acceptable for ocean disposal. The National Marine Fisheries Service prefers that the material be disposed ^{of} in ocean waters instead of ⁱⁿ near-shore ^{waters}. They feel the material can be used to cover more contaminated materials previously dumped at the Foul Area. Ocean disposal ^{was} ~~so~~ therefore ~~being~~ retained for further consideration with the Foul Area being the identified disposal site.

11. Sagamore Site - In order to accommodate all of the project

material at this location, additional space would be necessary. Some of the project material would have to be placed on land owned by the town of Bourne, adjacent to the property owned by the Sagamore businessman. Coordination with ^{the} town of Bourne has indicated that its parcel of property is being transferred to the North Sagamore Water District as part of its watershed conservation area for water supply. Therefore, disposal of project material on the town's property would be undesirable because of

consideration with the Foul Area being the identified disposal site.

11. Sagamore Site - In order to accommodate all of the project material at this location, additional space would be necessary. Some of the project material would have to be placed on land owned by the town of Bourne, adjacent to the property owned by the Sagamore businessman.

Coordination with town of Bourne has indicated that its parcel of property is being transferred to the North Sagamore Water District as part of its watershed conservation area for water supply. Therefore, disposal of project material on the town's property would be undesirable because of

potential chloride contamination in a designated watershed area. Also, placing a portion of the project material adjacent to the watershed

conservation area on the businessman's property would pose the same *since drainage from the site would flow towards the conservation area. Based on the potential impact* potential impact, on the designated watershed conservation area, this

disposal alternative was eliminated from further consideration.

K *index to here*
3 *%* Final Section - Screening the array of disposal alternatives, *resulted* in the identification of two acceptable disposal ^sites, the Camp Edwards upland site and the Foul Area ~~open water~~ ^{ocean} site. Selection of ^a disposal site for the proposed project was based on the net benefits criteria. Disposal of project material at the Foul Area would be the least cost alternative, thereby providing the greatest net economic benefit; therefore, it became the selected disposal site.

VIII. Coordination

The Corps of Engineers has consulted with numerous organizations and agencies and the public⁶ to gather information and opinions for this study and to keep them informed on its progress. Table 1³ summarizes the findings of this coordination in relation to specific environmental statutes⁵. Official correspondence may be found in Appendix 4 .

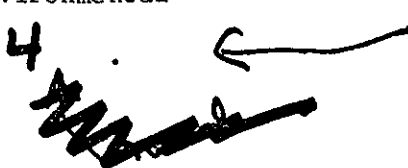


TABLE 13

RELATIONSHIP OF THE SELECTED PLAN TO
ENVIRONMENTAL REQUIREMENTS PROTECTION STATUTES

Federal Statutes

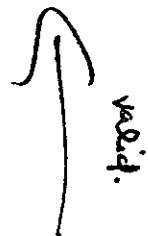
Archaeological and Historic Preservation Act, as amended, 16 U.S.C. 469 et seq.
Clean Air Act, as amended, 42 U.S.C 7401, et seq.
Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251 et seq.
Coastal Zone Management Act, as amended, 16 U.S.C. 1451, et seq.
Endangered Species Act, as amended, 16 U.S.C. 1531, et seq.
Estuary Protection Act, 16 U.S.C. 1221, et seq.
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq.
Fish and Wildlife Coordination Act, as amended, U.S.C 661, et seq.
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601 - 4601-11, et seq.
Marine Protection, Research and Sanctuaries Act, 22 U.S.C. 1401, et seq.
National Historic Preservation Act, as amended, 16 U.S.C. 470a, et seq.
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.
River and Harbor Act, 33 U.S.C. 401, et seq.
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq.

Executive Orders, Memoranda, etc.

Flood Plain Management (E.O. 11988)
Protection of Wetlands (E.O. 11990)
Environmental Effects Abroad of Major Federal Actions (E.O. 12114)
Analysis of Impacts on Prime and Unique Farmlands (CEQ Memorandum 30 Aug. 76)

NOTES: a. Applicable (A) - Statute, E.O., or other policy is applicable and has been complied with.
b. Not Applicable (NA) - Statute, E.O., or other policy not applicable.

A
NA
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NA



FINDING OF NO SIGNIFICANT IMPACT

~~Finding of No Significant Impact~~ The proposed East Boat Basin

project comprises expansion of the existing East Boat Basin, located on the Cape Cod Canal in Sandwich, ~~Mass.~~ ^{Massachusetts,} to accommodate additional recreational and commercial boats, plus some additional dredging in the existing basin, including construction of an entrance channel. The total area to be taken up by the expansion of the basin would be about 12 acres. Total amount of material to be removed would be 533,430 cubic yards, including 28,510 cubic yards of dredged material. Material would be placed in scows for dumping at the Foul Area ~~open-water~~ ^{ocean disposal} site about 45 miles to the northeast of the boat basin.

Various

~~A variety of~~ ^{alternatives} ~~were~~ ^{not} considered, both for development of the basin expansion and disposal of the dredged and excavated materials. Disposal alternatives included both upland and open-water sites. The selected development and disposal plans would create virtually no adverse environmental impacts.

After a complete, in-depth study and with coordination from other agencies, I have determined that the proposed project will not have any significant impacts which would necessitate the preparation of an Environmental Impact Statement.

Date

CARL B. SCIPLE

Colonel, Corps of Engineers

Division Engineer

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT
AND
ENVIRONMENTAL ASSESSMENT

APPENDIX 2

FORMULATION, ASSESSMENT AND EVALUATION OF PLANS

Prepared by the
New England Division, Corps of Engineers
Department of the Army

FORMULATION, ASSESSMENT AND EVALUATION OF PLANS

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FORMULATION, ASSESSMENT AND EVALUATION OF PLANS

This appendix provides the plan formulation rationale that led to the recommendation of a selected plan of improvement.

FORMULATION AND EVALUATION CRITERIA

Detailed technical, economic and environmental criteria were utilized in formulation and evaluation of alternative plans. The criteria provided a means of measuring each plan's performance against the established planning objectives. The various criteria are described below.

TECHNICAL CRITERIA

The technical criteria are as follows:

- Navigation feature dimensions (length, width and depth) should be adequate for the types of vessels expected to use the harbor.
- Alternative plans should propose the most efficient and desirable berthing/mooring system, to allow for maximum use of the expanded basin.
- Provide adequate clearance between the entrance channel and the west shoreline of the basin to avoid adverse impact on the stability of the west shoreline.

ECONOMIC CRITERIA

The economic criteria are as follows:

- Maximize net benefits (project benefits minus project costs).
- Maximize net benefits to the marine related activities at the basin and to the town of Sandwich.
- Minimize adverse construction impacts on existing development, thereby reducing construction costs.
- Minimize project costs by recommending less costly project features that adequately provide the required function.
- Minimize local onland development costs by recommending basin configurations that are consistent with local development plans.

ENVIRONMENTAL AND SOCIAL CRITERIA

The environmental and social criteria are as follows:

- Minimize the volume of material to be removed in order to reduce problems related to disposal of material.

- Maximize the beneficial use of material to be removed.
- Minimize adverse impacts on fish and wildlife resources.
- Maximize the safety and ease of navigation for both commercial and recreational craft.
- Maximize the cultural and aesthetic value of the harbor.

MANAGEMENT MEASURES

The formulation of alternative plans required the identification of a broad range of management measures to address the study objectives. Management measures are generally categorized as nonstructural or structural improvements.

NONSTRUCTURAL MEASURES

Nonstructural measures are implemented without performing any type of construction. They generally consist of implementing a harbor management plan to make existing facilities more efficient. The following nonstructural alternatives were considered for the East Boat Basin.

Alternative 1: Transfer commercial fishing vessels to other ports.

Commercial fishing vessels could be transferred to other ports, thereby allowing recreational boats to use the entire harbor. Fish offloading would continue to take place along the Cape Cod Canal bulkhead by transient fishing boats. This alternative would provide a good opportunity to address the recreational boating planning objective. However, the possibility of the commercial fishing boats finding space at other ports would be virtually nil, since regional fishing ports are already saturated or lack adequate facilities. In addition, two other factors must also be considered, the reluctance of fishermen to move from their historic port, and the local interest's desire to promote and expand the commercial fishing industry. Implementation of this alternative would be detrimental to the regional fishing industry, would be difficult to implement and would not be consistent with the desires of local interests. This alternative was dropped from further consideration.

Alternative 2: Transfer recreational boats to other ports.

Recreational boats can be transferred to other ports, thereby allowing commercial fishing boats to use the entire basin. This alternative would have the opposite effect by promoting the commercial fishing planning objective. This alternative is potentially implementable since regional recreational boating facilities are generally more available than commercial fishing facilities. The main problem with this scenario is

that the East Boat Basin services a large area with a high density of tourists and vacationers, many of whom use the basin for their boating activities. The nearest recreational harbors are 10 to 20 miles away, which would require substantial travel time when compared to operating out of the East Boat Basin. Demand for recreational boating use at the basin is well evidenced by the 116 boat owners on the active waiting list for berthing space. Based on the need to retain recreational boating opportunity at the East Boat Basin, this alternative was dropped from further consideration.

Alternative 3: Do nothing.

Doing nothing would not alleviate any of the existing problems and needs. Maintenance of the status quo would not provide opportunities to capitalize on the potential expansion of commercial fishing industry or the recreational boating activity. Since doing nothing does not address the planning objectives, it was eliminated from further study.

STRUCTURAL MEASURES

Structural measures consist of some type of construction to enhance existing navigation systems. At the East Boat Basin these measures would include the dredging and excavation of navigation features, construction of slope protection (riprap revetment or bulkhead), and construction of docks and piers. Implementation of structural improvements was considered

to be the most satisfactory means of addressing the problems and meeting the needs of the commercial fishing and recreational boating activities. Therefore structural measures were carried forward for further consideration.

PLAN FORMULATION RATIONALE

This section of the appendix describes the detailed plan formulation rationale on which the formulation of alternative plans was based.

PROJECTED MAXIMUM FUTURE CONDITION

In order to determine the size of basin expansion required, the maximum level of future activity was determined. Based on information provided by public interests, projections were made concerning the level of fishing industry that could be supported at Sandwich, and also concerning the expected level of future recreational boating activities.

Results of the projection analysis indicate that the Sandwich commercial fishing fleet could increase by about 40 vessels. However, only half would be new boats while the remainder would be transfers from other ports. The new boats would primarily develop the non-traditional fishery (including mostly surf clams and ocean quahogs, and some herring, mackerel, silver hake and squid), but some growth in the traditional fishery is anticipated. The East Boat Basin is also expected to attract

up to 10 charter fishing boats. Including the existing summer fleet, a total future fleet of about 94 vessels is expected.

Recreational boating activity will also realize future growth. The existing fleet of 100 boats will grow to 142 boats under the without-project condition, as boats on the waiting list are accommodated. The remaining 74 boats on the waiting list will be immediate growth under the with-project condition. In addition, future growth of about 114 permanent boats was projected over a period of 10 years based on the projected population growth for Barnstable County. The total future recreational fleet would be about 330 boats comprised of 300 permanent boats and 30 transient boats, assuming a constant level of transient activity.

LIMITING FACTORS

As discussed in the Planning Constraints section of the main body, expansion of the basin is limited by the amount of area local interests wish to use for on-land development. About 25 acres of land are available for expansion, including 22 acres of town of Sandwich property and about 3 acres of Federal property adjacent to the existing basin. This area would be divided between the two uses, navigation and onland development.

The prior expansion study performed by the town of Sandwich was used to determine the approximate breakdown of area to be allocated for each use. The study identified the type and number of facilities desired by

local interests in conjunction with a basin expansion project. Sufficient land area will be necessary to support the proposed development, which was reflected in the town's study. It indicated the approximate maximum basin expansion while maintaining a desirable level of surrounding development. Under Plan A and Plan B of the town's study, increases in water area of 11.6 acres and 7.9 acres resulted. Therefore, it was assumed that the approximate maximum allowable basin expansion was 11.6 acres, with the remaining area allocated to land development. The limitation of basin expansion placed a constraint on the formulation of plans.

Area requirement analyses determined that about 11.6 acres and 24.4 acres of water area for slip berthing and open mooring respectively, would be needed to accommodate the projected maximum condition. When these areas are compared to the approximate maximum allowable basin expansion, it can be seen that space requirements for the projected maximum condition cannot be satisfied by the open mooring condition. The slip berthing condition could substantially satisfy the projected maximum condition, considering that riprap slope area rather than bulkhead would increase the actual expansion area beyond 11.6 acres. Therefore, projected fleet growth was dependent on the configuration constraints of alternative plans.

PLANNING OBJECTIVES

Planning objectives were considered to assist in determining the type and degree of improvement that should be formulated. For the East Boat Basin, the first four planning objectives were considered in the formulation of plans specific to the proposed project site. There is great potential for increased commercial fishing activities and the town of Sandwich fully supports development of the industry. There is ample evidence to support major increases in recreational boating at the basin also. Due to the constrained nature of the project area, an adequate navigation system must be proposed. The town also has definite ideas on the type of development desired at the basin and has provided the prior expansion study to be utilized as a tool to express their desires.

Plan formulation was directed towards attempting to satisfy all four of the planning objectives rather than focusing more attention on a lesser number of the objectives. None of the planning objectives may fully meet the maximum projected condition, but the opportunity exists to substantially achieve all the objectives. Therefore plans were formulated to increase commercial fishing and recreational boating activities on a relatively equal basis, while maintaining a balance between the size of navigation system expansion and the land area required to support the future on-land development desired by local interests.

PLAN FORMULATION

Consideration of available management measures, projected future conditions, planning constraints and planning objectives gave direction to the formulation of plans. Various structural measures were selected for implementation in an improvement project. A range of alternative plans from no expansion to approximate maximum expansion were formulated to compare the resultant impacts of different size plans. Also, various configurations were considered to examine potential impacts due to varying the locations of project components, both water and on land. In order to avoid excessive reorganization of the present infrastructure, all alternatives were formulated to maintain recreational activities on the same side of the basin as at present. Commercial activities would be separated from the recreational activities, and would be located on the east side and/or rear of the expanded basin. Standard engineering criteria were used to properly size the navigation system, and foundation studies were performed to define subsurface conditions for the formulation of slope protection measures.

Eight preliminary alternative plans were formulated and analyzed. Plan descriptions and results of preliminary plan evaluation are summarized in the Analysis of Plans Considered In Preliminary Planning section of the main body.

REITERATIVE FORMULATION

Conclusion of the preliminary evaluation process resulted in the retention of four alternative plans for detailed study. The plans were then reexamined to determine if any reformulation would be necessary. Discussions with local interests and reconsideration of project elements indicated that minimal changes and refinements should be made to the remaining alternatives prior to detailed evaluation.

Changes and refinements were primarily associated with the dimensioning of navigation features. The entrance channel at the basin entrance was widened to assure safe navigation in this critical area. The size of turning/maneuvering areas and berthing areas were refined as necessary. Based on discussions with the Sandwich harbormaster the proposed depth of recreational berthing areas was increased from 6 feet to 8 feet below mean low water. Minor changes in basin configuration and location of bulkheading were made to make plans more efficient and/or less costly.

DESCRIPTION, ASSESSMENT AND EVALUATION OF DETAILED PLANS

This section of the appendix describes the four alternative plans that were carried forward from preliminary planning. The alternatives were then assessed and comparatively evaluated as a basis for selection of a recommended plan.

DESCRIPTION OF PLANS

All of the detailed plans would expand the existing basin by excavating/dredging a landcut into the parcel of land owned by the town of Sandwich. The plans differ mainly in the perimeter configuration and location of navigation features, and somewhat in size. Each plan includes an entrance channel, a turning/maneuvering area, offloading areas for fishing boats, a commercial berthing area and a recreational berthing area. Depths for the navigation features are consistent for all plans as listed below.

Entrance channel - 14 feet below mean low water (MLW)

Turning/maneuvering area - 14 feet below MLW

Offloading area - 14 feet below MLW

Commercial berthing area - 12 feet below MLW

Recreational berthing area - 8 feet below MLW

A multiple-use two-way entrance channel would be constructed through the existing basin to provide access to the basin expansion. The channel width at the basin entrance would be 180 feet, with the east channel line tying into the existing bulkhead. Under the proposed Corps of Engineers bulkhead rehabilitation/replacement project, the bulkhead on the east side of the basin entrance will be replaced with riprap revetment. If this project has been implemented prior to the expansion project, then the new

riprap slope would be moved back to make room for the channel. The entrance channel would extend about 400 feet into the basin at the 180 foot width, and then transition into a 120 foot wide channel. The channel alignment would be the same for all plans to this point.

Riprap revetment would be used to protect most the basin expansion perimeter, with steel sheet pile bulkhead proposed in and around fish offloading areas. The top elevation for riprap slopes and bulkhead was set at 11 feet NGVD (National Geodetic Vertical Datum). This elevation is satisfactory for offloading fishing boats along bulkhead areas. For purposes of the navigation project, slopes were carried back to existing grade on a 1 vertical to 2 horizontal slope.

Two harbor management measures would be incorporated into each plan including separation of navigation activities and the use of rack storage for small recreational boats.

The without-project condition has recreational boats and commercial fishing vessels berthed on both sides of the existing basin in order to maximize the use of available space. However, under the proposed expansion project the two activities would be separated to avoid potential conflicts and inconveniences. This would be consistent with the separation of landward facilities for each activity, which is organizationally more efficient. Therefore, all plans propose separate areas for each navigation activity, generally separated by the entrance channel.

The town of Sandwich also wishes to incorporate rack storage of recreational boats into an expansion project. A rack storage facility for 120 boats up to 25 feet in length was proposed by the town's study. Therefore, this feature would be included in an overall harbor project. It was assumed that rack storage would help satisfy the demand for small boat storage, leaving the expansion for larger craft.

Differences among the detailed plans are further described in the following sections. Alternative plans are also illustrated in Figures 2-1 through 2-4.

Plan A

Plan A provides a rectangular expansion area extending south about 600 feet parallel to Gallo Road. The expansion would increase water area by 7.8 acres, while taking up a total area of 9.4 acres when riprap slope area is included.

The 120-foot wide entrance channel skews right into the expansion separating the commercial and recreational berthing areas. The channel would terminate at a 160 foot by 440 foot turning/maneuvering area at the rear of the basin. Adjacent to this area along the shoreline would be fish offloading areas. The expansion would provide increases of 1.4 acres and 3.3 acres in recreational berthing and commercial berthing areas, respectively.

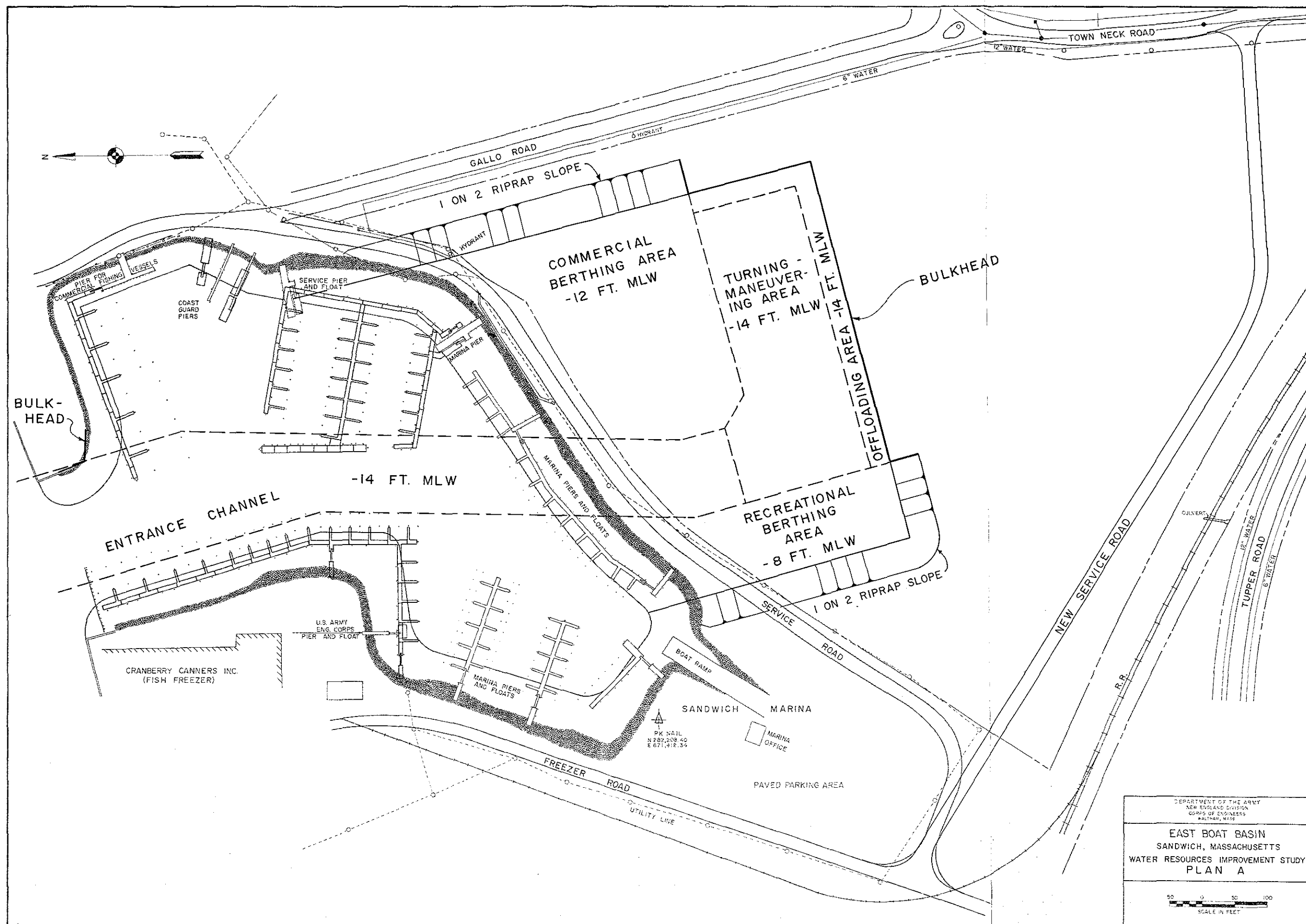


FIGURE 2-1

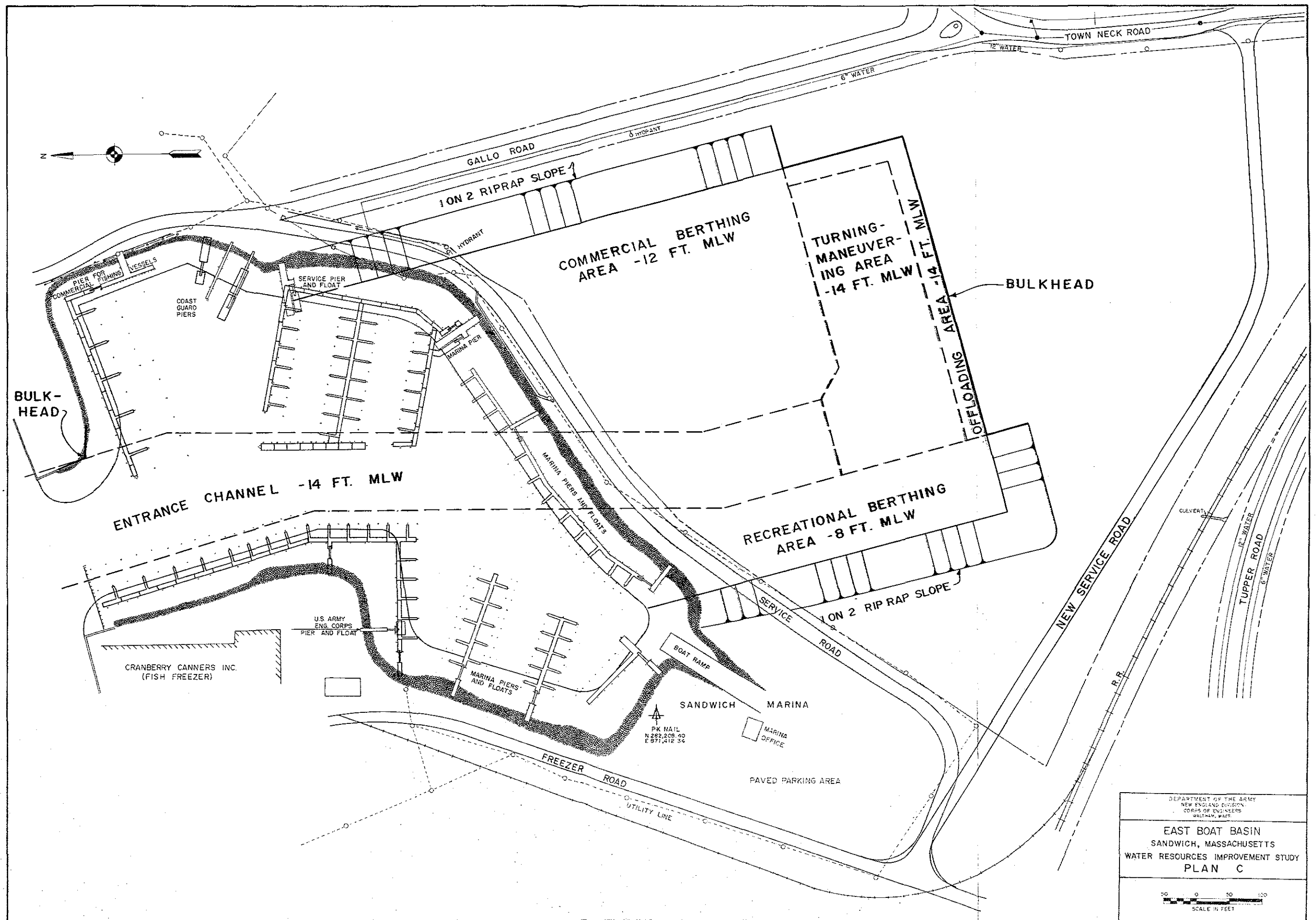


FIGURE 2-3

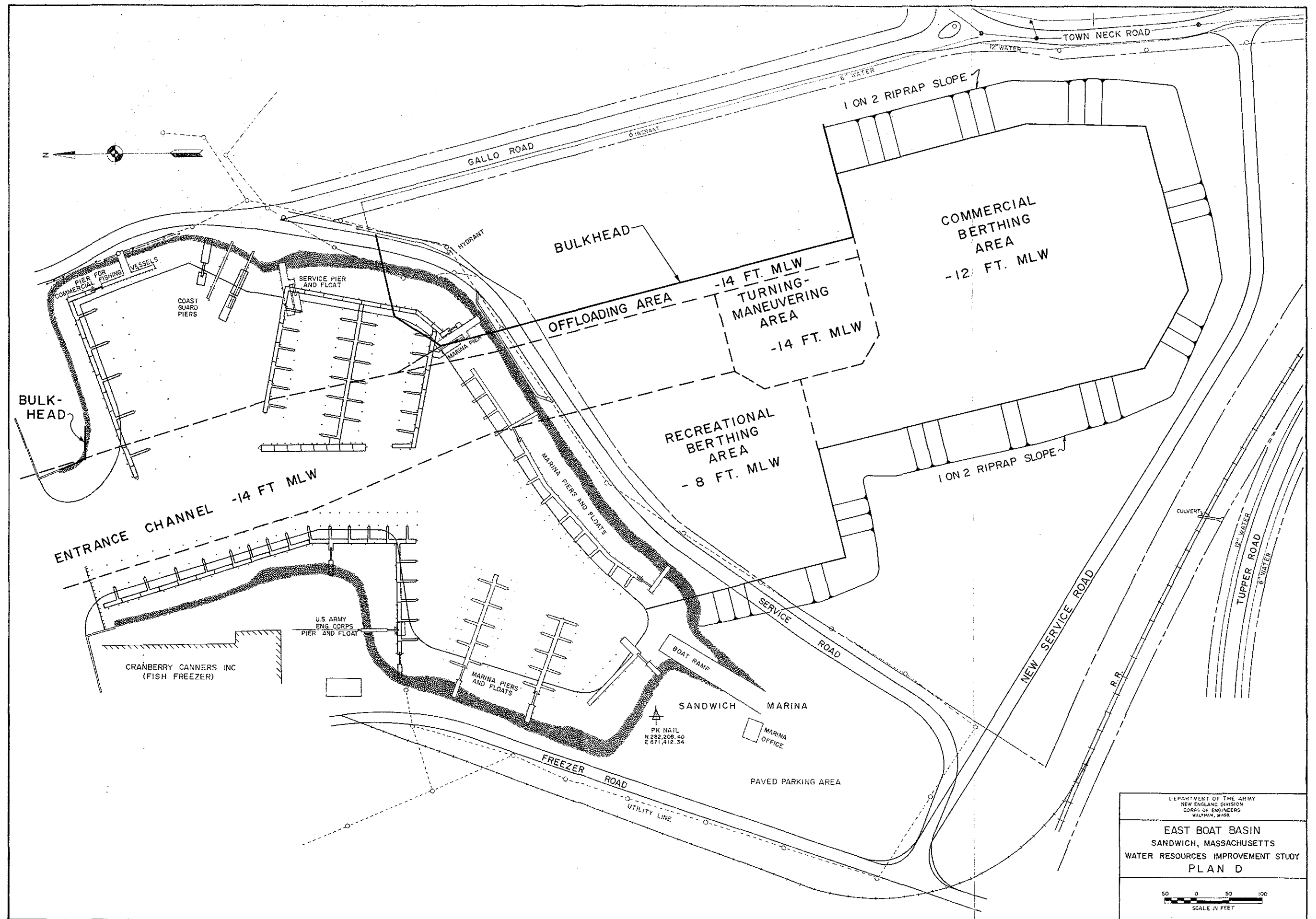


FIGURE 2-4

Plan B

Plan B provides a different basin expansion configuration than the previous plan. The major difference is in the location of fish off-loading areas, which would be located near the center of the expanded basin along the east side. A sizeable peninsula for location of offloading facilities would extend about halfway into the basin. The entrance channel, following the same alignment as the previous plan and abutting the offloading peninsula, would terminate at a 160 foot by 420 foot turning/maneuvering area located in behind the peninsula. This area would provide access to the commercial and recreational berthing areas located further inside the basin.

The total increase in water area would be 9.7 acres, resulting in a total expansion of 12.4 acres including area requirements for riprap slope. Plan B would provide expanded recreational berthing of 2.3 acres and commercial berthing of 4.3 acres.

Plan C

Plan C is the same as Plan A except that the expansion area extends about 150 feet farther back than Plan A. The increase in water area would be 9.9 acres, with total area of 12.0 acres taken up, including riprap slope.

The entrance channel alignment and turning/maneuvering area are identical to those in Plan A. However, recreational berthing and commercial berthing areas will be greater with areas of 1.8 acres and 4.5 acres, respectively.

Plan D

This plan is similar to Plan B with respect to the location of off-loading facilities. However, the offloading area extends along the side of the basin, rather than extending into the basin. The increase in water area would be 9.8 acres, with a total expansion of 12.7 acres including riprap slope area. Areas of 2.8 acres and 4.6 acres would be provided for recreational berthing and commercial berthing, respectively, in the expansion area.

The entrance channel alignment would be different, swinging left and then abutting the offloading area. The channel would terminate at a 160 foot by 230 foot turning/maneuvering area. This area would provide access to the commercial berthing area farther into the basin. The recreational berthing area would be located adjacent to and west of the entrance channel.

IMPACT ASSESSMENT

This section describes the impacts that would result from construction of an expansion project, including dredging/excavation impacts, impacts on navigation and economic impacts. Environmental impacts are addressed in detail in Appendix 1, as are socioeconomic impacts in Appendix 3.

Dredging/Excavation Impacts

Each of the plans would require the removal of material from the existing basin and expansion area. Existing basin material would be minimal, consisting primarily of entrance channel material. In addition to the entrance channel, Plans A and C would also require some dredging of material from the eastern portion of the existing basin. This area would remain at present depths for Plans B and D.

The dredging/excavation of the expansion area will require a maximum cut of about 36 feet from channel depth to existing grade. The landcut portion of material was separated into dry and wet excavation for cost estimating purposes, based on observed average ground water levels. The dredging/excavation impacts are summarized in Table 2-1 below.

Table 2-1

Dredging/Excavation Quantities

<u>Plan</u>	<u>Dredging (C.Y.)</u>	<u>Excavation* (C.Y)</u>		<u>Total (C.Y.)</u>
		<u>Dry</u>	<u>Wet</u>	
A	29,550	132,000	270,120	431,670
B	19,780	221,020	357,040	597,840
C	28,510	171,280	333,640	533,430
D	13,820	190,560	354,180	558,560

*Excavation would occur in the expansion area only.

Navigation Impacts

The navigation system proposed for all plans would provide adequately dimensioned features that would allow safe and efficient navigation for all expected vessels. The entrance channel would provide sufficient width to accommodate two-way traffic for fishing vessels up to 80-90 feet in length. The width would also satisfy the increase in volume of recreational boating traffic, including existing boats, new boats, rack storage boats and trailered boats. The entrance channel depth would allow vessels to enter the basin at all times, thereby precluding tidal delays and preventing the navigation hazards of waiting in the Cape Cod Canal.

In addition, the apparent spaciousness of the entrance channel and turning/maneuvering area would allow emergency mooring of many larger fishing vessels during periods of rough weather, thereby serving as a much better harbor of refuge than at present.

The expansion area would provide additional berthing space for both recreational boats and commercial fishing vessels. Economics determined that slips should be proposed for the recreational berthing area, since open mooring would not provide growth of the recreational fleet. The commercial berthing area would realize benefits with implementation of either the slip berthing or open mooring schemes; however, benefits would be less under the open mooring condition. Expected increase in the wet storage fleet for each plan are summarized in Table 2-2 below.

Table 2-2

Projected Fleet Increases

✓ <u>Plan</u>	<u>Recreational</u>	<u>Commercial Vessels</u>	
	<u>Boats</u>	<u>Slip Berthing</u>	<u>Open Mooring</u>
A	1	40	17
B	32	50	21
C	15	52	22
D	53	44	15

Implementation of the alternative plans would disrupt the without project condition berthing configuration, resulting in the displacement of some recreational boats. However, there would be no loss of berthing space for existing boats which would be relocated to another portion of the expanded basin. These impacts have been taken into account in Table 2-2, which indicates the net projected fleet increases.

✓ As indicated on Table 2-2, the alternative plans would not be able to substantially meet the projected maximum future ~~X~~condition because of planning limitations. However, a large portion of the projected increase would be small boats 25 feet or under. As part of the formulation process it was assumed that a 120 boat dry storage facility would be provided by the town of Sandwich to address the demand for small boat storage. Consequently, the projected increases in the wet storage fleet would be comprised of boats over 25 feet. The total projected recreational fleets for each plan, including rack storage are summarized in Table 2-3.

Table 2-3

Total Recreational Fleet

✓ <u>Plan</u>	<u>Existing</u> <u>Boats</u>	Growth Boats		<u>Total</u> <u>Fleet</u>
		<u>Rack</u> <u>Storage</u>	W X et <u>Storage</u>	
A	142	120	1	263
B	142	120	32	294
C	142	120	15	277
D	142	120	53	315

With the incorporation of rack storage the projected maximum future condition can be substantially met for recreational boating, ranging from 80-95 percent.

Since development of the commercial fishing industry in Sandwich is a major objective of the town, the degree to which the projected maximum future condition could be met would be somewhat greater. The open mooring scheme would range from 63 to 70 percent, and the slip berthing scheme from 89 to 102 percent of the projected maximum future condition.

Economic Impacts

Project Costs

The total project first cost of the navigation project would include only the cost for construction of the basin expansion, meaning cost for material removal, slope protection and other related costs. The cost of constructing slips would not be directly attributable to the navigation project. However, slip costs were estimated for inclusion into the economic justification analysis.

Navigation project and slip first costs were amortized over a 50-year project life to determine annual costs. The discount rate applicable to Federal projects is .0806, which corresponds to a 7.875 percent annual interest rate. In addition, an annual maintenance charge was developed for incorporation into the annual cost of the navigation project. Tables 2-4 through 2-7 summarize project first cost and annual cost for Plans A, B, C and D, for the navigation project. Tables 2-8 and 2-9 provide the estimated first cost and annual cost of recreational slips and commercial slips, respectively.

Table 2-4

Project Cost Estimates - Plan A

First Cost

Material removal	\$3,282,000
Riprap revetment	108,000
Bulkhead	2,262,000
Other costs	<u>500,000</u>
Subtotal	\$6,152,000
Contingencies (20%)	<u>1,230,000</u>
Subtotal	\$7,382,000
Engineering and design (7%)	517,000
Supervision and administration (7%)	<u>517,000</u>
Total First Cost	\$8,416,000

Annual Cost

Amortization	\$678,000
Maintenance charge	<u>17,000</u>
Total Annual Cost	\$695,000

Table 2-5

Project Cost Estimates - Plan BFirst Cost

Material removal	\$4,547,000
Riprap revetment	176,000
Bulkhead	3,190,000
Other costs	<u>503,000</u>
Subtotal	\$8,416,000
Contingencies (20%)	<u>1,683,000</u>
Subtotal	\$10,099,000
Engineering and design (7%)	707,000
Supervision and administration (7%)	<u>707,000</u>
Total First Cost	\$11,513,000

Annual Cost

Amortization	\$928,000
Maintenance charge	<u>17,000</u>
Total Annual Cost	\$945,000

Table 2-6

Project Cost Estimates - Plan C

First Cost

Material removal	\$4,066,000
Riprap revetment	140,000
Bulkhead	2,262,000
Other costs	<u>503,000</u>
Subtotal	\$6,971,000
Contingencies (20%)	<u>1,394,000</u>
Subtotal	\$8,365,000
Engineering and design (7%)	586,000
Supervision and administration (7%)	<u>586,000</u>
Total First Cost	\$9,537,000

Annual Cost

Amortization	\$769,000
Maintenance charge	<u>18,000</u>
Total Annual Cost	\$787,000

Table 2-7

Project Cost Estimates - Plan D

First Cost

Material removal	\$4,284,000
Riprap revetment	201,000
Bulkhead	3,045,000
Other costs	<u>505,000</u>
Subtotal	\$8,035,000
Contingencies (20%)	<u>1,607,000</u>
Subtotal	\$9,642,000
Engineering and design (7%)	675,000
Supervision and administration (7%)	<u>675,000</u>
Total First Cost	\$10,992,000

Annual Cost

Amortization	\$886,000
Maintenance charge	<u>16,000</u>
Total Annual Cost	\$902,000

Table 2-8

Recreational Slip Cost Estimates

<u>Item</u>	Plan			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Construction cost	\$363,000	\$600,000	\$469,000	\$724,000
Contingencies (20%)	73,000	120,000	94,000	145,000
Subtotal	\$436,000	\$720,000	\$563,000	\$869,000
E&D (7%)	31,000	50,000	39,000	61,000
S&A	31,000	50,000	39,000	61,000
Total Cost	\$498,000	\$820,000	\$641,000	\$991,000
Annual Cost	\$40,000	\$66,000	\$52,000	\$80,000

Table 2-9

Commercial Slip Cost Estimates

<u>Item</u>	Plan			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Construction cost	\$490,000	\$613,000	\$636,000	\$615,000
Contingencies (20%)	98,000	123,000	127,000	123,000
Subtotal	\$588,000	\$736,000	\$763,000	\$738,000
E&D (7%)	41,000	52,000	53,000	52,000

S&A	41,000	52,000	53,000	52,000
Total Cost	\$670,000	\$840,000	\$869,000	\$842,000
Annual Cost	\$54,000	\$68,000	\$70,000	\$68,000

✓ Costs were estimated for two possible wet storage conditions in the commercial area, open mooring and slip berthing. Annual costs for each of the two conditions were determined by adding the appropriate annual costs for each combination. Table 2-10 summarizes the annual costs for the two conditions.

Table 2-10

Total Annual Cost

<u>Plan</u>	<u>Annual Cost</u>	
	<u>Open Mooring</u>	<u>Slip Berthing</u>
A	\$735,000	\$789,000
B	\$1,011,000	\$1,079,000
C	\$839,000	\$909,000
D	\$982,000	\$1,050,000

Annual Benefits

Benefits expected to accrue if a project is implemented include commercial fishing benefits, recreational boating benefits and charter boat fishing benefits. Commercial fishing benefits are based on the value of increased fish landings attributable to new fishing vessels.

Recreational boating benefits and charter fishing benefits are based on the value of increased recreation time to new recreational boaters and charter boat fishermen. The project benefits for each alternative plan are enumerated in Table 2-11 below, for both wet storage conditions.

Table 2-11

Summary of Benefits (in 000's)

<u>Plan</u>	<u>Condition</u> [*]	<u>Commercial</u>	<u>Recreational</u>	<u>Charter</u>	<u>Total</u>
		<u>Fishing</u>	<u>Boating</u>	<u>Fishing</u>	
A	OM	\$1,387.0	\$3.9	\$58.1	\$1,449.0
	SB	\$2,827.7	\$3.9	\$154.8	\$2,986.4
B	OM	\$1,944.3	\$110.0	\$77.4	\$2,131.7
	SB	\$3,534.7	\$110.0	\$193.5	\$3,838.2
C	OM	\$1,944.3	\$62.2	\$77.4	\$2,083.9
	SB	\$3,771.2	\$62.2	\$193.5	\$4,026.9
✓ D	OM	\$1,154.8	\$163.8	\$58.1 X	\$1,376.7
✓	SB	\$3,064.2	\$163.8	\$174.2	\$3,402.2

*OM - Open mooring, SB - Slip berthing

Economic Justification

✓ Determination of economic justification was performed by comparing the annual project benefits to the annual project economic costs to obtain the benefit-cost ratio (BCR). A BCR of 1 or greater indicates that the benefits of the project outweigh the costsⁿ of the project, resulting in an economically feasible project.

In addition to the annual cost of construction, land acquisition and interest during construction costs were included in the economic justification analysis. The adjusted annual costs were then compared with the annual benefits to obtain the BCRs and annual net benefits. Annual net benefits provides a measure of the benefit that would be generated by the project after cost has been incurred. Table 2-12 summarizes annual benefits, adjusted annual costs, BCRs and annual net benefits.

Table 2-12

Economic Justification (000's)

<u>Plans</u>	<u>Annual Benefits</u>	<u>Annual Costs</u>	<u>BCR</u>	<u>Net Benefits</u>
A OM	\$1,449.0	\$829.0	1.7	\$620.0
SB	\$2,986.4	\$887.4	3.4	\$2,099.0
B OM	\$2,131.7	\$1,138.2	1.9	\$993.5
SB	\$3,838.2	\$1,211.1	3.2	\$2,617.1
C OM	\$2,083.9	\$950.2	2.2	\$1,133.7
SB	\$4,026.9	\$1,026.0	3.9	\$3,000.9
D OM	\$1,376.7	\$1,108.0	1.2	\$268.7
SB	\$3,402.2	\$1,181.0	2.9	\$2,221.2

Cost Apportionment

Three cost apportionment scenarios were considered and/or analyzed, *cost-sharing based on precedent and cost-sharing* traditional cost-sharing, as proposed by the administration. Cost-sharing policies proposed by the administration are addressed in the *of the main body* Recommendations section. The remaining cost-sharing scenarios are summarized herein.

The cost-sharing summaries do not take the cost of placing slips into account, since they are not considered as part of the navigation system

that is under study. Cost estimates for slips were developed, however, for economic evaluation purposes. In order for local interests to consider the full cost impact on them, the slip costs summarized in Tables 2-8 and 2-9 should also be included as a local cost when applicable.

Traditional cost-sharing was determined for two conditions in the commercial area, open mooring and slip berthing. The decision regarding placement of slips in the commercial area will affect project benefits and cost-sharing. Tables 2-13 and 2-14 summarize the traditional cost sharing for each condition.

Table 2-13

Traditional Cost-Sharing - Open Mooring

<u>Plan</u>	<u>Federal</u>		<u>Non-Federal</u>	
	<u>Cost</u>	<u>Percent</u>	<u>Cost</u>	<u>Percent</u>
A	\$3,729,000	44.3	\$4,686,000	55.7
B	\$4,982,000	43.3	\$6,528,000	56.7
C	\$4,670,000	49.0	\$4,868,000	51.0
D	\$4,740,000	43.1	\$6,252,000	56.9

Table 2-14

Traditional Cost-Sharing - Slip Berthing

<u>Plan</u>	<u>Federal</u>		<u>Non-Federal</u>	
	<u>Cost</u>	<u>Percent</u>	<u>Cost</u>	<u>Percent</u>
A	\$1,777,000	21.1	\$6,638,000	78.9
B	\$1,554,000	13.5	\$9,954,000	86.5
C	\$2,187,000	22.9	\$7,348,000	77.1
D	\$1,305,000	11.9	\$9,687,000	88.1

Cost-sharing could also be affected by the precedent established because of the existing ^{authority under which the ~~exp~~ present} marina. House Document 168, which recommended ^{was ~~construct~~ implemented} construction of the 1963 expansion, states that local interests should be required to construct a marina in the expansion. A marina was in fact placed in the 8-foot Federal anchorage constructed in 1963. Therefore, the recreational portion of the proposed expansion project may be cost-

✓ sharible by the Federal government ^x on a 50/50 basis, according to *Traditional* recreational cost-sharing policies. Tables 2-15 and 2-16 summarize the affect of this possibility. Impact would be minimal because the cost of constructing the recreational area would be relatively small compared to the total project cost. Comparison with Tables 2-13 and 2-14 indicate the affect this possibility could have on cost-sharing.

Table 2-15

Precedent Based Apportionment - Open Mooring

<u>Plan</u>	Federal		Non-Federal	
	<u>Cost</u>	<u>Percent</u>	<u>Cost</u>	<u>Percent</u>
A	\$4,114,000	48.9	\$4,301,000	51.1
B	\$5,666,000	49.2	\$5,844,000	50.8
C	\$5,135,000	53.8	\$4,403,000	46.2
D	\$5,350,000	48.7	\$5,642,000	51.3

Table 2-16

Precedent Based Apportionment - Slip Berthing

<u>Plan</u>	Federal		Non-Federal	
	<u>Cost</u>	<u>Percent</u>	<u>Cost</u>	<u>Percent</u>
A	\$2,162,000	25.7	\$6,253,000	74.3
B	\$2,238,000	19.4	\$9,270,000	80.6
C	\$2,652,000	27.8	\$6,883,000	72.3
D	\$1,915,000	17.4	\$9,077,000	82.6

COMPARISON OF DETAILED PLANS

All plans generally address the problems and needs in the same manner, through construction of a basin expansion. Depths of areas and channel dimensions are consistent for all plans. The physical differences would be in the configuration of the expansion area, including the location and size of project features. Project economics and the degree to which planning objectives are met, are affected by these variables.

The four plans can be roughly grouped into two categories based on where offloading of fish would take place; at the back of the basin (Plans A and C), or along the east side of the basin (Plans B and D). Plans A and C are virtually the same, except that Plan C is somewhat larger. The variation in location of offloading areas affects the location of the other project features. In Plans A and C vessels would have to travel to the back of the basin to offload, whereas Plans B and D would provide offloading nearer the front of the basin. This factor could have some impact on traffic patterns within the basin.

There is also a trade-off between the two groups of plans in that Plans B and D provide somewhat larger recreational berthing areas, thereby addressing the recreational boating objective to a greater extent. In comparing the three larger plans (Plans B, C and D), which are comparable in size, the increase in the commercial fleet would be similar except for Plan D. Plan D has an entrance channel alignment that displaces a portion

of the existing fleet, which would most likely obtain space in the expansion area, thereby reducing its capacity for new vessels. Plan A, ✓ the smallest plan, trades off less ^{cost} wet~~er~~ for ~~x~~ smaller fleet increase^s.

Plans A and C also physically separate the commercial fishing and ✓ recreatinal^o boating activities with a central entrance channel, whereas in Plans B and D the two areas abut. It may be desirable to keep these activities separate.

✓ Comparison of environmental impacts can be performed based on the size of plans. As the size of each plan increases, so do the impacts. The two factors to consider are the amount of material that would be removed, and the extent of expansion inland. Material disposal would have impacts at the disposal site, and the amount of construction would affect the ✓ immediate environem^ont. For amount of material to be disposedst, plans would ✓ be ranked A, C, D, B from least to greatest, and for amount of expansion, plans would be ranked A, C, B, D from least to greatest.

Comparison of economic impacts examined the relative costs, benefits and cost apportionment for detailed plans. The larger the plan the greater the cost, with plans ranked A, C, D, B from least to greatest. The east side offloading plans would have a greater cost impact because of additional bulkhead, a high cost item, which is required for this type of configuration. However, there is a potential tradeoff in that more access to the basin would be provided for other than offloading facilities.

Final planning for the project could pare down or increase the amount Bulkhead desired by local interests, for any of the plans. In addition to ✓ the cost of each navigation plan, additional cost would be incurred by ✓ local interests for slips in the recreational area and ^{most likely} ~~probably~~ the commercial area.

Plan C would provide the greatest benefit since it projects the greatest increase in commercial fishing benefits, which are greater than the value placed on recreational boating. Slips would be placed in the recreational berthing area to insure growth in the recreational fleet; ✓ however, sufficient benefits would be generated by open moored fishing boats so that slips would not be required in the commercial area. With open-mooring of fishing vessels, the projected fleet increase would be smaller, and therefore the benefits would be less attractive. Slips in the commercial area would be preferred to maximize benefits.

The apportionment of project cost addressed construction of the navigation project only and not the cost of slips, which are a local expense. However, apportionment of costs would be affected by the decision to implement or not to implement slips in the commercial area. Cost-sharing policies are such that Federal participation in project features that are proposed to use slip berthing is not allowed. Therefore, local cost-sharing would suffer when maximizing benefits through the use of slips. The local cost-share would range from about 51 to 56.9 percent for open-mooring, and from about 77.1 to 88.1 percent for

slip berthing. Plans A and C would provide the greater Federal cost-share because the entrance channel and turning/maneuvering area are larger for those plans, and Federal cost-sharing for those features is greater.

The affect of alternative plans on the existing basin would be similar for all plans. The entrance channel would eliminate berthing space because of its space requirements and would cause some reorganization of slips. The expansion would also displace recreational boats that presently berth along the back of the basin. The only real difference between alternatives regarding the existing basin, is that Plan D has a different channel alignment that would eliminate more berthing space than plans A, B or C.

Another factor of comparison to be considered by local interests would be the compatibility of basin configuration with onland development. The alternatives offer several general possibilities that could probably be modified somewhat, if necessary. The varying locations of project features would affect the location and density of onland development, and the future traffic problems in the area. Each of the alternatives with associated onland development would also vary in aesthetics. In comparing plans, local interests should conceptualize and visualize what they feel each alternative would look like in a fully developed state.

✓ The System of Accounts provides a summary ^{comparative} evaluation of the four detailed plans. The System of Accounts provides a concise format that compares the expected impacts of detailed plans in terms of the National Economic Development (NED) objective, and the national accounts of Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). It also demonstrates plan performance in terms of planning objectives, planning constraints and other measures of acceptability. Table 2-17 provides the System of Accounts, for the slip condition in the commercial berthing area only since the maximum net benefits are generated under the slip condition. Alternative plan impacts would be virtually the same for the open-mooring condition, except that benefits would be less, and cost-sharing would be more advantageous to local interests. These differences can be compared in tables of the previous section.

In addition to the System of Accounts, Table 2-18 provides a summary of significant EQ effects for various resource areas. It provides an additional source of information for determining the net EQ effects of the proposed project.

TABLE 2-17

SYSTEM OF ACCOUNTS

Account	1 Without-Project Condition	2 Plan A	3 Plan B	4 Plan C	5 Plan D
I. PLAN DESCRIPTION					
A. Federal Structures					
1. Entrance Channel	None Delineated	120' wide x 14' deep x 1060' long	120' wide x 14' deep x 1030' long	120' wide x 14' deep x 1220' long	120' wide x 14' deep x 1080' long
2. Turning/Manuever- ing Area	None Delineated	450' x 60' (1.8 acres)	390' x 160' (1.7 acres)	450' x 160' (1.8 acres)	230' x 160' (.8 acres)
B. Local Structures					
1. Commercial Berth- ing Area	40 Slips	3.3 acre increase 80 total slips	4.3 acre increase 90 total slips	4.5 acre increase 92 total slips	4.6 acre increase 84 total slips
2. Recreational Berthing Area	132 slips	1.4 acre increase 133 total slips	2.3 acre increase 164 total slips	1.8 acre increase 147 total slips	2.8 acre increase 185 total slips
3. Bulkhead offload- ing Area	None	660' x 30'	800' x 30'	660' x 30'	670' x 30'
4. Bulkhead	None	780 lineal feet	1100 lineal feet	780 lineal feet	1050 lineal feet
C. Federal Land Require- ments	None	2.5 acres	1.2 acres	2.5 acres	1.9 acres
D. Local Land Require- ments	None	6.9 acres	11.2 acres	9.5 acres	10.8 acres
II. NATIONAL ECONOMIC DEVEL- OPMENT					
A. Implementation Cost					
1. Federal-naviga- tion project	N/A	\$1,777,000	\$1,554,000	\$2,187,000	\$1,305,000
2. Non-Federal					
a. Navigation project	N/A	\$6,638,000	\$9,954,000	\$7,348,000	\$9,687,000
b. Slips	N/A	\$1,168,000	\$1,660,000	\$1,510,000	\$1,833,000
c. Total non- Federal	N/A	\$7,806,000	\$11,614,000	\$8,858,000	\$11,520,000
3. Total project cost	N/A	\$9,583,000	\$13,168,000	\$11,045,000	\$12,825,000

TABLE 2-17

SYSTEM OF ACCOUNTS
(Continued)

Account	1 Without-Project Condition	2 Plan A	3 Plan B	4 Plan C	5 Plan D
4. Economic value of land	N/A	\$423,000	\$558,000	\$540,000	\$572,000
5. Interest during construction	N/A	\$796,000	\$1,092,000	\$921,000	\$1,066,000
6. Total project investment	N/A	\$10,802,000	\$14,818,000	\$12,507,000	\$14,463,000
B. Annual Charges					
1. Interest and amortization	N/A	\$870,000	\$1,194,000	\$1,008,000	\$1,165,000
2. Maintenance charge	N/A	\$17,000	\$17,000	\$18,000	\$16,000
3. Total annual charge	N/A	\$887,000	\$1,211,000	\$1,026,000	\$1,181,000
C. Annual Benefits					
1. Increased fish landings	N/A	\$2,828,000	\$3,534,000	\$3,771,000	\$3,064,000
2. Charter boat fishing	N/A	\$155,000	\$194,000	\$194,000	\$174,000
3. Recreational boating	N/A	\$4,000	\$110,000	\$62,000	\$164,000
4. Total annual benefits	N/A	\$2,987,000	\$3,838,000	\$4,027,000	\$3,402,000
D. Benefit-Cost Ratio	N/A	3.4 to 1	3.2 to 1	3.9 to 1	2.9 to 1
E. Net Annual Benefits	N/A	\$2,100,000	\$2,627,000	\$3,001,000	\$2,221,000
III. ENVIRONMENTAL QUALITY					
A. Material Removal (c.y.)					
1. Dredged material	0	29,550	19,780	28,510	13,820
2. Excavated material	0	402,120	578,060	504,920	544,740
3. Total material	0	431,670	597,840	533,430	558,560
B. Water Quality					
1. Short-term impacts in harbor	None	Turbidity	Same as 2	Same as 2	Same as 2

TABLE 2-17

SYSTEM OF ACCOUNTS
(Continued)

<u>Account</u>	<u>1</u> <u>Without-Project</u> <u>Condition</u>	<u>2</u> <u>Plan A</u>	<u>3</u> <u>Plan B</u>	<u>4</u> <u>Plan C</u>	<u>5</u> <u>Plan D</u>
2. Long-term impacts in harbor	None	Minor degradation	Same as 2	Same as 2	Same as 2
3. Short-term impacts at disposal site	None	Turbidity	Same as 2	Same as 2	Same as 2
4. Long-term impacts at disposal site	None	May improve habitat	Same as 2	Same as 2	Same as 2
C. Air Quality					
1. Short-term impacts	None	Fuel emissions, dust and noise during construction	Same as 2	Same as 2	Same as 2
2. Long-term impacts	None	Minor degradation from increased fuel emissions and noise	Same as 2	Same as 2	Same as 2
D. Plants and Animals					
1. Aquatic vegetation destroyed	No change	Yes, temporary, will increase habitat due to increased harbor area	Same as 2	Same as 2	Same as 2
2. Benthic fauna destroyed	No change	Yes, temporary, will increase habitat due to increased harbor area	Same as 2	Same as 2	Same as 2
3. Fishery habitat destroyed	No change	Yes, temporary, will increase habitat due to increased harbor area	Same as 2	Same as 2	Same as 2
4. Terrestrial vegetation destroyed	Possible upland development at site by local interests	Yes, minimal, surrounding area to be developed by local interests	Same as 2	Same as 2	Same as 2
5. Terrestrial wildlife displaced or destroyed	Possible upland development at site by local interests	Yes, minimal, surrounding area to be developed by local interests	Same as 2	Same as 2	Same as 2

TABLE 2-17

SYSTEM OF ACCOUNTS
(Continued)

<u>Account</u>	<u>1</u> <u>Without-Project</u> <u>Condition</u>	<u>2</u> <u>Plan A</u>	<u>3</u> <u>Plan B</u>	<u>4</u> <u>Plan C</u>	<u>5</u> <u>Plan D</u>
E. Visual Appearance					
1. Temporary impact on aesthetics	No change	Yes, construction equipment and turbidity	Same as 2	Same as 2	Same as 2
2. Permanent impact on aesthetics	Possible upland development at site by local interests	Additional docks and upland development	Same as 2	Same as 2	Same as 2
F. Land Use					
1. Wetlands lost	None	Same as 1	Same as 1	Same as 1	Same as 1
2. Nondeveloped area disrupted	Possible upland development at site by local interests	Area adjacent to project to be used for stockpiling and dewatering, if necessary	Same as 2	Same as 2	Same as 2
3. Commercial land use disrupted	No	Yes, parking lot and service road	Same as 2	Same as 2	Same as 2
4. Recreational land use disrupted	No	Yes, parking lot and service road	Same as 2	Same as 2	Same as 2
IV. REGIONAL ECONOMIC DEVELOPMENT					
A. Income	Continued growth	Substantial growth, due to increased activity at the basin	Same as 2	Same as 2	Same as 2
B. Employment	Continued growth	Substantial growth, dependent upon level of upland development	Same as 2	Same as 2	Same as 2
C. Promotes Growth of Regional Business and Industry	Continued growth	Yes, accelerated growth	Same as 2	Same as 2	Same as 2
D. Property Values	Continued growth	Appreciation of land value will accelerate in the area	Same as 2	Same as 2	Same as 2
V. OTHER SOCIAL EFFECTS					
A. Construction Impacts					
1. Disruption of recreational boating	None	Yes	Same as 2	Same as 2	Same as 2

TABLE 2-17

SYSTEM OF ACCOUNTS
(Continued)

<u>Account</u>	<u>1</u> <u>Without-Project</u> <u>Condition</u>	<u>2</u> <u>Plan A</u>	<u>3</u> <u>Plan B</u>	<u>4</u> <u>Plan C</u>	<u>5</u> <u>Plan D</u>
2. Disruption of commercial fishing	None	Yes	Same as 2	Same as 2	Same as 2
3. Health and safety hazards	None	Construction equipment increases health and safety risks	Same as 2	Same as 2	Same as 2
4. Vehicular traffic	None	Traffic on other roads may increase	Same as 2	Same as 2	Same as 2
5. Disruption of other recreation	None	Yes	Same as 2	Same as 2	Same as 2
6. Disruption of business	None	Yes	Same as 2	Same as 2	Same as 2
B. Post-Construction Impacts					
1. Archeological and historical value lost	None	Same as 1	Same as 1	Same as 1	Same as 1
2. Safety of navigation	None	Increased safety	Same as 2	Same as 2	Same as 2
3. Increased vehicular traffic	None	Yes	Same as 2	Same as 2	Same as 2
4. Displacement of people/resources	None	Same as 1	Same as 1	Same as 1	Same as 1
5. Community cohesion	No change	Same as 1	Same as 1	Same as 1	Same as 1
6. Community growth	Continued growth	Growth accelerated	Same as 2	Same as 2	Same as 2
7. Recreation opportunities	No change	Increased opportunity	Same as 2	Same as 2	Same as 2
VI. <u>ACHIEVES PLANNING OBJECTIVES</u>					
A. Planning Objectives					
1. Growth of commercial fishing fleet	None	100% increase	(44) 125% increase	130% increase	110% increase

TABLE 2-17

SYSTEM OF ACCOUNTS
(Continued)

<u>Account</u>	1 <u>Without-Project Condition</u>	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>	<u>Plan D</u>
2. Growth of recreational boating fleet	None	1% increase - wet storage 85% increase - with rack storage	23% increase - wet storage 107% increase - with rack storage	11% increase - wet storage 95% increase - with rack storage	37% increase - wet storage 122% increase - with rack storage
3. Safety of navigation	Congested	Safety enhanced	Same as 2	Same as 2	Same as 2
4. Socioeconomic development growth	Minimal growth	Substantial accelerated growth	Same as 2	Same as 2	Same as 2
5. Enhancement of environmental resources	Maintains existing resources	Development takes place at existing harbor area. Project material will cap contaminated material disposed of at the Foul Area for previous projects.	Same as 2	Same as 2	Same as 2

Table 2-18

Significant EQ Effects - Plans A, B, C and D

<u>Significant Resource</u>	<u>Effects on EQ Attributes</u>			<u>Notes</u>
	<u>Ecological</u>	<u>Cultural</u>	<u>Aesthetic</u>	
East Boat Basin	<u>Beneficial</u> Increased fish and benthic habitat.	No effect	<u>Beneficial</u> People enjoy obser- ving marine related activities.	The basin expansion would provide a larger harbor resource area.
	<u>Adverse</u> Temporary disruption of fish and benthic habitat. Permanent disruption of terrestrial wildlife habitat. Minimal de- gradation of water quality.		<u>Adverse</u> Increased development. Increased harbor activity. Disrup- tion of existing activities during construction. Turbid water.	The basin expansion would increase activity in and around the basin.

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Cape Cod Canal

Adverse

No effect

Adverse

Minimal turbidity
near the East Boat
Basin entrance.
Minor degradation
of water quality.

Dredge scow
traffic during
construction.

Strong canal
currents would
quickly disperse
turbidity and
small amounts of
pollutants coming
out of the basin.

Massachusetts Bay
(Foul Area)

Beneficial

No effect

Adverse

May provide new
benthic habitat.
May prevent/slow
down release of
contaminants from
previous dredgings.

Dredge scow
✓ traffic during
construction.

The project
material is very
clean, compared
to typical
dredged material.

Adverse

Suspended material may
affect marine life.

SELECTING A PLAN

✓ Plan^C selected as the recommended plan for implementation. The rationale for selection of Plan C is that it would generate the maximum net benefits. This is in keeping with the National Economic Development policies, which promote the increase of the nation's economic output. Plan C is also favorable from the environmental quality point of view, since it would rank second lowest in material to be disposed of. It also ranks second lowest in expansion size, which would reduce impacts on surrounding non-developed areas. The central entrance channel of Plan C would separate the two marine activities, thereby preventing potential problems. Based on this rationale Plan C appears to be the most acceptable plan. The description and discussion concerning the selected plan is contained in the main body of the Feasibility Report. *in The Selected Plan section*

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT
AND
ENVIRONMENTAL ASSESSMENT

APPENDIX 3
SOCIOECONOMIC IMPACTS

Prepared by the
New England Division, Corps of Engineers
Department of the Army

Socioeconomic Impacts

East Boat Basin Expansion

Sandwich, Massachusetts

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Socioeconomic Impacts
East Boat Basin Expansion

Introduction

This portion of the East Boat Basin report is devoted to a discussion of socioeconomic impacts and issues related to expansion of the basin. Previous sections of the report have identified the social and economic characteristics of the study area, and a description of the basin facilities and activities has been provided. The without-project conditions have also been identified within other sections of the report.

With-Project Conditions

Four plans for expansion of the basin have reached this level of study. As described in more detail in Appendix 2 of this report, each plan includes an entrance channel, a turning/maneuvering area, offloading areas for fishing boats, a commercial berthing area and a recreational berthing area.

Construction Impacts

Short term impacts resulting from construction activities would be felt at the immediate project site as well as at potential disposal sites and along their routes. The construction period is estimated to last approximately 2 years with activity going on practically year-round. Construction during the summer season would prove the most disruptive to

normal basin activities. Noise and air pollution levels, including dust and odors, would increase. To minimize interference with usual activities it may be possible to restrict excavation to areas furthest from the existing basin during the summer season.

At present, the area designated for expansion is unused. However, the town's plans for reorganizing space within the existing basin include the placement of a large parking lot along the service road. This parking lot is expected to handle the increased vehicles anticipated as a result of the basin reorganization. The Corps expansion project would eliminate this parking area resulting in a shortage of adequate parking. However, the town may temporarily make due with existing parking until final discussions regarding expansion are made.

Eventually as construction continues, the back of the existing basin would be dredged and the service road would be removed. Boats and slips along the back of the basin would be removed. This displacement would be permanent, although the new berthing area would compensate for this loss. Also the fueling station would have to be relocated, at least on a temporary basis. The loss of the service road would require rerouting traffic heading for the east side of the basin. A new service road would eventually be provided; however, existing local roads would have to temporarily absorb increased traffic.

Two sites are being considered for disposal of project material, an ocean site and an upland site. Under the ocean disposal option, project material would be barged through the Cape Cod Canal to the Boston Foul

Area. Estimating 1500 cubic yards of material per barge, somewhere between 300 and 400 barge trips would be required to remove all the material depending on the plan implemented.

Two options exist for transporting the excavated material to the Cape Cod Canal for ocean disposal. One option would be to place a scow in the basin to receive material from the excavation site. To keep the activity continuous, scows would be used on a rotating basis. Material would be transferred across the service road to be loaded on the scow at the back of the existing basin. Loading the scow at this location would displace several slips and boats that typically utilize that space. The movement of scows in and out of the basin would threaten safety and increase congestion in an already crowded basin. Docks in the front part of the basin would also have to be removed to provide adequate space for the scows to move in and out.

The second option would be to place a scow in the canal along the bulkhead. Material would then be trucked from the excavation site to the bulkhead, limiting some effects felt in the basin. This would burden the service road, reduce safety, and risk spillage.

Upland disposal at Camp Edwards would require loading excavated material on trucks to be transported to the disposal site. Standard 10-wheel dump trucks with about 15 cubic yard capacity or a trailer dump truck with 30 cubic yard capacity could be used in the disposal operation. Somewhere between 33,000 and 46,000 truck trips for the standard dump truck and 17,000 to 23,000 for the trailer dump truck would

be necessary, depending upon the specific plan implemented. A standard truck could be filled every 15 minutes and a trailer truck every half hour. If several concurrent loading operations are used, trucks could be leaving every 5 to 10 minutes during peak hours. Two routes to Camp Edwards are under consideration; a highway route and a through-town route. The town route utilizes Water Street and is less than half the distance that would be travelled on the highway. However, Water Street traverses the center of town. Taking the highway route, trucks would travel west along Tupper Road to circle back and pick up the Mid-Cape Highway. The use of the through-town route would have more serious traffic related effects as well as increased air and noise pollution levels in an area less tolerant than the highway route. The threat to safety and the risk of spillage would be more serious in town. The center of town is very picturesque and attracts many tourists. The Sandwich Glass Museum is located in the center across from the town hall.

Several sites at Camp Edwards are to be designated for stockpiling the project material. It is anticipated that the project material would be used by the military for roadbed material or other possible construction-type uses.

Post-Construction Impacts

The most significant impact of an expansion project is alleviation of congested basin conditions and further satisfaction of demands on the commercial and recreational potential of the basin.

Fleet projections under the without project condition indicate a recreational fleet of 142 boats and a commercial fleet of 40 boats. This growth would occur after implementation of the town's basin plan which provides slips for some recreational boats currently on a waiting list and commercial boats which raft together. Both recreational and commercial boats would be located on each side of the basin.

The Corps' proposed plans include a harbor management measure that would separate the recreational and commercial fleets, by placing the recreational fleet on the west side of the basin and the commercial on the east. This would result in a reorganization of the slips as placed on the town's plan.

Under the expansion project, 102 recreational boats would be accommodated in the existing basin as opposed to the 142 accommodated under the town's plan. The shift of recreational boats from the east to the west side of the basin (Corps plan) would result in displacement of 16 boats that could not be accommodated on the west and an additional displacement of 24 recreational boats that currently berth along the back of the basin. Sufficient space would be available in the recreation expansion area to accommodate these 40 boats. Each plan would then provide additional space to accommodate the following number of new boats: Plan A, 1; Plan B, 32; Plan C, 15; and Plan D, 53.

All boats in slips under the without project conditions are likely to retain slips with the project, although general location may change. Plans B and D, offering the largest increases in recreational berthing

space in the expansion area, could accommodate the remainder of boats on the waiting list and would have excess space for new boats. Plan C is just shy of accommodating all the waiting list boats, whereas Plan A is short several spaces. Boats currently on the waiting list for an in-water slip may be assigned a dry rack spot because slips would be used by boats with lengths meeting the slip's capacity. It is expected that some dry storage may be provided under the without project condition, although expansion of such a facility could take place with the project.

Dry rack storage, although more convenient than boat trailering, does not offer the convenience of having a slip. However, it is anticipated that those boat owners who would keep their boat at the marina rather than trailering on a day to day basis, would find it more convenient to have their boat launched and are likely to use their boat more often. A slip, however, still provides an extra degree^{of} convenience over dry storage. The boat owner with the slip would not have to phone ahead to have his boat launched at a particular time. Also, there is no fee attached to each launching as there could be with rack storage.

Proper management of a dry storage facility would be required for its success, and would also fall under town responsibility. Dry storage is an appealing option to the town since it would help to satisfy the demand for small boat storage requiring limited water space.

There would be no change in the size of the commercial fleet that would berth in the existing basin under the with project condition. With the Corps improvement, ^{however, all commercial vessels would be on the} east side of the basin. Additional commercial

vessels would be berthed in the expansion area. The number varies with each plan and also depends on the use of slips or open moorings. A summary of the expansion plans and their capacities is presented in Table³⁻_A1.

Table 3-1Basin Expansion Plans

	<u>Increased Water area (in acres)</u>	<u>Total Area</u>	<u>Increased rec. berthing</u>		<u>Increased Comm. berthing</u>		
			<u>acres</u>	<u>boat capacity*</u>	<u>acres</u>	<u>slips</u>	<u>moorings</u>
Plan A	7.8	9.4	1.4	1	3.3	40	17
Plan B	9.7	12.4	2.3	32	4.2	50	21
Plan C	9.9	12.0	1.8	15	4.5	52	22
Plan D	9.8	12.7	2.8	53	4.6	44	15

*After accommodating 40 displaced boats.

Benefits to the commercial industry are realized through increased fish landings. As indicated previously, the commercial fleet would more than double in size in each plan with the use of slip berthing. Open mooring would not allow as large an increase. It is assumed that half of the "new" boats that would permanently locate in Sandwich as a result of the expansion would be transfers from other ports who would find Sandwich a preferable location over their current location. The other new boats would be actual growth of the fleet that would generate increased landings. These benefits have been enumerated in the economic analysis.

With the potential for increased fish landings the town would want to attract support facilities along the offloading area and surrounding the expansion area. Offloading area within the basin would eliminate the hazards experienced by smaller vessels unloading along the bulkhead, where the existing facilities are located. It is anticipated that the new facilities would reduce the waiting period of smaller fishing boats, since the larger fishing vessels are generally given preference at the existing facilities. It is expected that the in-basin facilities would handle different species than the bulkhead businesses and would therefore complement rather than compete with their operations, although bulkhead facilities are likely to see an increase in business as well. Facilities to be provided include those for freezing and packing fish, repair facilities, ice manufacture capabilities, other support services, and some tourist needs, (i.e. restaurants). Adequate access to the offloading areas and other facilities would have to be provided. A report prepared for the town in 1979 raises many issues that the town needs to consider.

A comprehensive planning effort therefore should be under taken by the town for development of a plan managing the development of support and other facilities. The expansion along with subsequent development would provide numerous local benefits including increased berthing fees, property tax on new pleasure boats, property tax from new buildings, and fees from leased industrial land. The local economy would also benefit from the new activity with the creation of some additional jobs and increased activity for existing businesses.

The town must assume an extremely active role in assuring that the potential of the improvement project is realized. Of local responsibility is the placement of slips in both the commercial and recreational berthing areas. Because use of slips, rather than open mooring, is the recommended berthing method, the town would also be required to fund the dredging of the slip areas. The Corps plan provides for the most economically efficient use of the berthing areas and assumes that the recreational area would be used by the larger boats.

Plan C has been designated the selected plan. All plans, however, offer some potential to enhancing the commercial and recreational opportunities in the basin. Each would present the town with development considerations indicated in general terms above. Plan C was chosen, basically because it produces the highest total net benefits. Benefits for each plan are provided in tabular form with the economic analysis.

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

FEASIBILITY REPORT
AND
ENVIRONMENTAL ASSESSMENT

APPENDIX 4
PUBLIC VIEWS AND COMMENTS

Prepared by the
New England Division, Corps of Engineers
Department of the Army

PUBLIC VIEWS AND COMMENTS

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U. S. Fish and Wildlife Service - May 25, 1983	4-80

PUBLIC REVIEW COMMENTS AND RESPONSES (After Public Review)

PUBLIC ANNOUNCEMENT



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDPL-C

7 July 1980

ANNOUNCEMENT

INITIATION OF A NAVIGATION STUDY

FOR

EAST BOAT BASIN, SANDWICH, MASSACHUSETTS

The New England Division of the United States Army Corps of Engineers is initiating an investigation of the East Boat Basin, located on the south side of the Cape Cod Canal in Sandwich, Massachusetts, to determine whether any modifications are advisable at this time, particularly for the benefit of the existing and prospective commercial fishing and recreational boating fleets. The investigation is authorized by a resolution adopted 9 May 1978 by the Committee on Public Works and Transportation, U.S. House of Representatives.

The existing Federal project in the East Boat Basin consists of a 2.7 acre harbor of refuge dredged and constructed in the late 1930's to a depth of 13 feet. This portion was dredged under the authority of the existing project for the Cape Cod Canal which authorized the provision of accessory and minor features deemed necessary to provide facilities for the maintenance and repair of floating plant used in connection with the operation of the canal. A 4.3-acre extension to the basin originally dredged to a depth of 8 feet, was authorized by the River and Harbor Act of 1958.

The town of Sandwich and other local interests desire to expand the existing East Boat Basin to relieve the current overcrowded conditions and to accommodate the increasing recreational and commercial fishing fleets. The town purchased 11.1 acres of land adjacent to and south of the existing basin in May 1978 in anticipation of providing an extra 175 boat spaces with access through the East Boat Basin. Additional contiguous land of 11.4 acres already owned by the town will provide a total of 22.5 acres of land for development of concomitant services and goods. A map showing the existing project and a general description of the area of expansion proposed by local proponents is attached as Inclosure 1.

The study will advise the Congress on whether there is a Federal interest in improvements or other modifications to the existing East Boat Basin Project based on applicable Federal laws and policies. A favorable recommendation will require that the navigation improvements be economically justified, i.e.,

the benefits attributed to the project exceed the cost of construction and subsequent maintenance; that the environmental, social, and/or other consequences of the project are generally acceptable to the publics; and that a local cooperating agency formally indicates its willingness and capability to provide the non-Federal requirements for the project.

The New England Division will conduct the study in three stages, in accordance with the planning procedures established by the Corps of Engineers' regulations which are responsive to the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources." These procedures are summarized in Inclosure 2 for your information.

Presently, we are conducting Stage 1 investigations to determine the need for and extent of future work required for the study. These investigations involve analyzing current and probable future conditions in the East Boat Basin area to identify navigation needs and other water and related land resource concerns which should be addressed by the study. Based on available information and preliminary engineering, environmental, and economic studies, we will evaluate those solutions which appear to be the most viable to determine whether improvements for navigation and possibly other water resource needs are sufficiently justified economically to warrant further study. The results of these Stage 1 studies will be summarized and presented in a Reconnaissance Report. If these studies result in favorable findings, we will develop a Study Program to outline the effort and schedule of work to be performed in Stages 2 and 3 of the Study.

I wish to emphasize that the Corps of Engineers considers active public participation in our studies critical to the success of developing acceptable projects that are responsive to the current and future water and related land resource needs of the nation. In this regard, we are developing a program for public participation in the East Boat Basin Study to provide for the interchange of information between the interested publics and the Corps of Engineers. This program will allow public input to influence the development and evaluation of plans in reaching a study decision. In soliciting public input to Stage 1 of the study, we intend to conduct a public meeting; coordinate with appropriate Federal, State, and local government agencies; meet with various boating, commercial fishing, and environmental interests; and attempt to contact all other interested parties.

At this time, we are interested in obtaining any available information you may have concerning the navigation problems and needs or other water and related land resource needs in the East Boat Basin area. This information, which will be considered in Stage 1 studies, can include:

1. The number, type, and draft of the commercial fishing and recreational boating fleets.
2. The amount of commercial fishing in recent years.

3. The description of any restrictions in commercial fishing and recreational boating due to inadequate channels and/or land based facilities.

4. The description of expected future expansion of navigation facilities including commercial fishing industry, and marinas.

5. Or other information describing navigation conditions in the area.

We also will welcome your views and opinions on other problems and desired improvements which should be considered in the study. If the information is too voluminous for immediate transmittal, a letter including a list of available data that you could provide would allow us to make arrangements to review and possibly obtain the information. It would be appreciated if information could be furnished within 30 days after receipt of this notice.


Correspondence providing information or raising questions concerning the East Boat Basin Study should be addressed to:

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

Please feel free to contact me by telephone at (617) 894-2400 or in my absence, Mr. James Abcouwer, Project Manager, at (617) 894-2400, Extension 556.

We have attempted to send this notice to all individuals and organizations who may have an interest in this study. If you know of anyone who may desire to be involved, and who has not been contacted by us, please provide them with a copy of your letter or ask them to contact our office.

Sincerely,


MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

2 Incls

1. Project Map
2. Summary of Corps of Engineers
Planning Procedure

U.S. ARMY CORPS OF ENGINEERS WATER AND RELATED LAND RESOURCES PLANNING

LEGISLATIVE AND EXECUTIVE POLICIES

The U.S. Army Corps of Engineers Engineering Regulations (ER 1105-2-200 series) established procedures for conducting feasibility studies for planning Federal water and related land resources projects. These procedures are consistent with the requirements of legislative and executive policies including the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources," the National Environmental Policy Act of 1969 (PL 91-190), Sections 122 and 209 of the River and Harbor Act of 1970 (PL 91-611), the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), as well as others. In addition, the planning of Federal Water Resources projects reflects the requirements of Executive guidelines including pertinent Executive Orders.

PLANNING GOALS

The Water Resources Planning policy instituted by the Principles and Standards (P&S) for Federal and Federally assisted water related land planning identifies two national goals towards which planning should be directed, and a system of four accounts to measure plan effects. The two national goals towards whose enhancement the formulation of alternatives will be directed are National Economic Development (NED) and Environmental Quality (EQ). The national objective of economic development is achieved by increasing the value of the nation's output of goods and services and improving national economic efficiency. The national EQ objective is to enhance the quality of the environment through the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

The system of accounts to be established displays the beneficial and adverse effects of each alternative plan for the NED and EQ national goals, and for the categories of Regional Development (RD) and Social Well-Being (SWB) toward providing a basis for plan comparison and decision-making. Contributions to Regional Development (RD) are determined by evaluating a proposal's effects on a region's real income, employment, population, economic base environment, and social development. Contributions to the Social Well-Being Account (SWB) are determined by evaluating a proposal's effects on real income, security of life, health and safety, education, cultural and recreational opportunities, emergency preparedness, and other factors.

CORPS OF ENGINEERS PLANNING PROCESS

The Corps of Engineers planning procedures establish a planning framework to guide planning for the conservation, development, and management of the water and related land resources. The framework requires the systematic preparation and evaluation of alternative ways of addressing problems, needs, concerns, and opportunities under the Principle and Standards (P&S) objectives of National Economic Development (NED) and Environmental Quality (EQ). This results in information necessary to make effective choices regarding resource management under existing and projected conditions. Alternative plans are formulated without bias to structural or nonstructural measures.

Plans are developed in three stages, initial, intermediate, and final. During the initial stage, planners formulate a conceptual plan of the study to guide subsequent planning. During the intermediate stage, a broad range of plans is developed and analyzed. In the final stage, plans are screened and detailed plans are developed to furnish a basis for selection and recommendation. During each stage, four functional planning tasks are accomplished. They are problem identification, formulation of alternatives, impact assessment, and evaluation. The four planning tasks are emphasized in varying degrees in the different planning stages. Problem identification is the most important task during Stage I studies, whereas the emphasis shifts more toward impact assessment and evaluation in Stage II as more detailed plans are developed. Figure 1 shows the relative emphasis placed on each task during the various study stages. On the figure, the relative amount of emphasis placed on each task is indicated by the size of the block as compared to the size of the other blocks in that stage. A higher level of detail for data and analysis and more precise alternative plans are obtained as the study progresses through each plan development stage. The process of iterating the four planning tasks in each stage provides flexibility to the study to be receptive to changing needs, rising opposition, or support for modified alternatives, new and refined data, and more appropriate or modified alternatives. Further, this approach provides a systematic planning process to allow for review by higher Corps of Engineers echelon and public interests, and to facilitate study management.

STAGE 1 - RECONNAISSANCE.

The general purpose of this stage is to make an initial analysis of water and related land resource management problems and solutions to determine whether additional study is warranted and to develop a study program for subsequent planning. During this initial stage, the four planning tasks are performed at a preliminary level of detail to define the scope and character of the study and delineate planning objectives, including the range of issues related to resource management in the study area and the alternative solutions to these issues. Because of the introductory nature of the planning tasks at this stage, the effort generally involves gathering and analyzing a wide range of available information and public views and desires. The product of this stage is a Reconnaissance Report which documents the Stage 1 findings, justification for further study, and the program for work in Stages 2 and 3, including the study cost schedule.

STAGE 2 - INTERMEDIATE PLANS.

The purpose of Stage 2 is the selection of alternative plans which will be considered for recommendation during Stage 3. In Stage 2, all viable alternatives will be evaluated to determine their feasibility from economic, environmental, engineering and public acceptability viewpoints. Decisions made during Stage 2 must include a determination of the Federal interest in the alternative plans based on Federal laws and policies. Based on a more definitive analysis of the problems and needs in/or related to the study area, alternative management plans will be formulated without concentrating on detailed engineering design and impact quantification. The data will be sufficient to set forth and analyze the feasibility of alternative resource management plans. The potential impact of these alternative plans will be assessed, concentrating on significant contributions to the four accounts of NED, EQ, RD, and SWB as well as public perceptions of these impacts. The results of this effort will be used to decide which management plans warrant detailed considerations in Stage 3.

STAGE 3 - FINAL PLANS.

The objective of the final planning stage is the selection of a plan for recommendation. During Stage 3, emphasis is on modifying, assessing, and evaluating the intermediate alternatives carried into Stage 3 to produce detailed, implementable plans. The product of Stage 3 is the final study document which presents the recommendations of the Division Engineer, including information on the overall study findings, Environmental Impact Statement, and pertinent information from interested publics leading to the recommendations. The design, impact assessment, and evaluation of the final alternative plans will require specific and well-defined data at a comparable level for each plan in such a way that an effective choice can be made by the decision-making publics.

PUBLIC INVOLVEMENT.

The general policies of the Corps of Engineers for public involvement and citizens participation are provided in Engineering Regulation 1105-2-800, "PUBLIC INVOLVEMENT: GENERAL POLICIES." In this regulation, "public" is defined as any affected or interested non-Corps of Engineers entity. This includes other Federal, regional, State, County or local government agencies and officials, public and private organizations, and individuals.

It is the policy of the U.S. Army Corps of Engineers that water resources studies be conducted in an atmosphere of public understanding, trust, and mutual cooperation. The objective of public involvement and citizens participation is the active involvement of the public in water resources studies to assure that they respond to public needs and preferences to the maximum extent possible, within the bounds of local, State and other Federal programs, responsibilities and authorities.

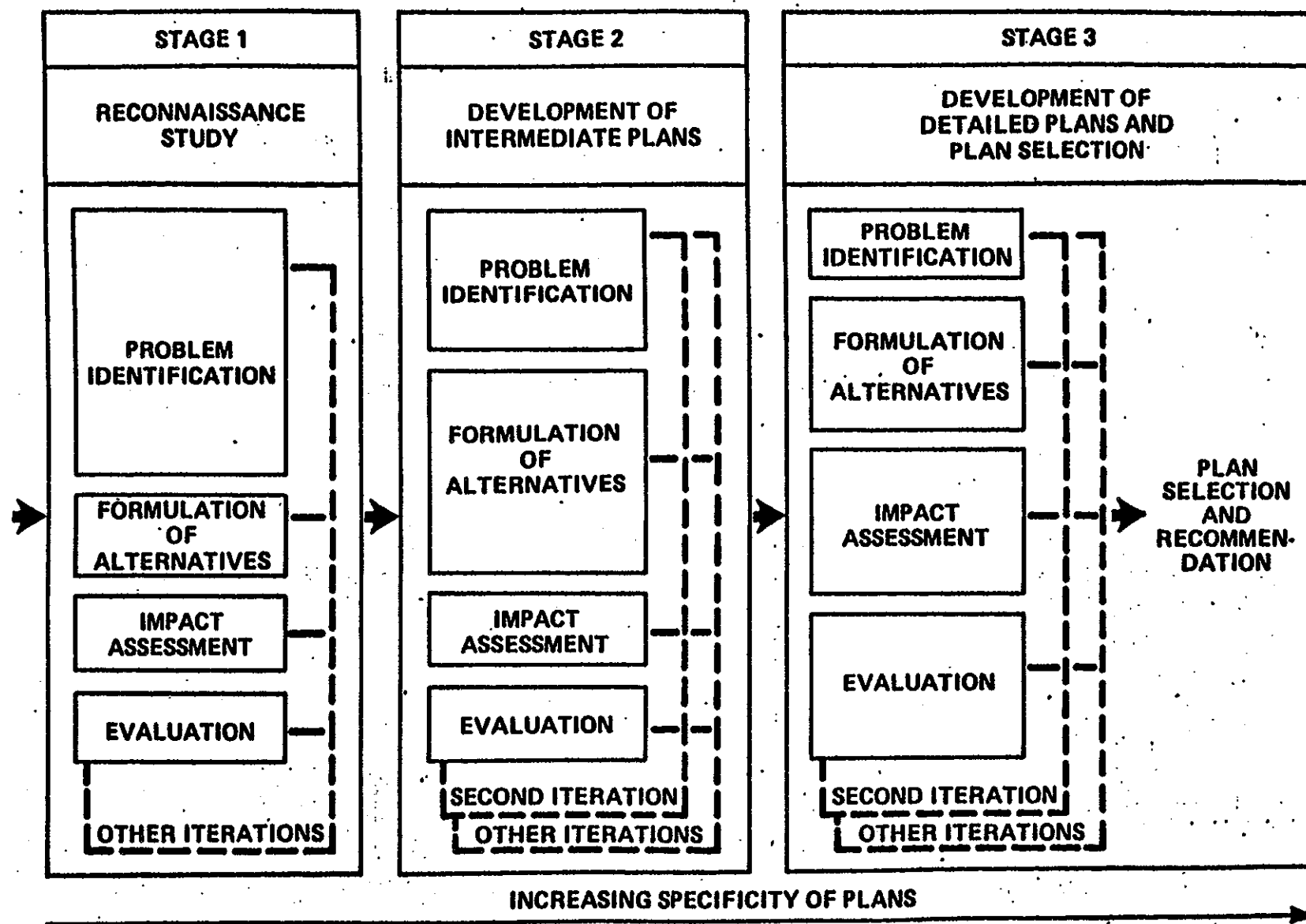
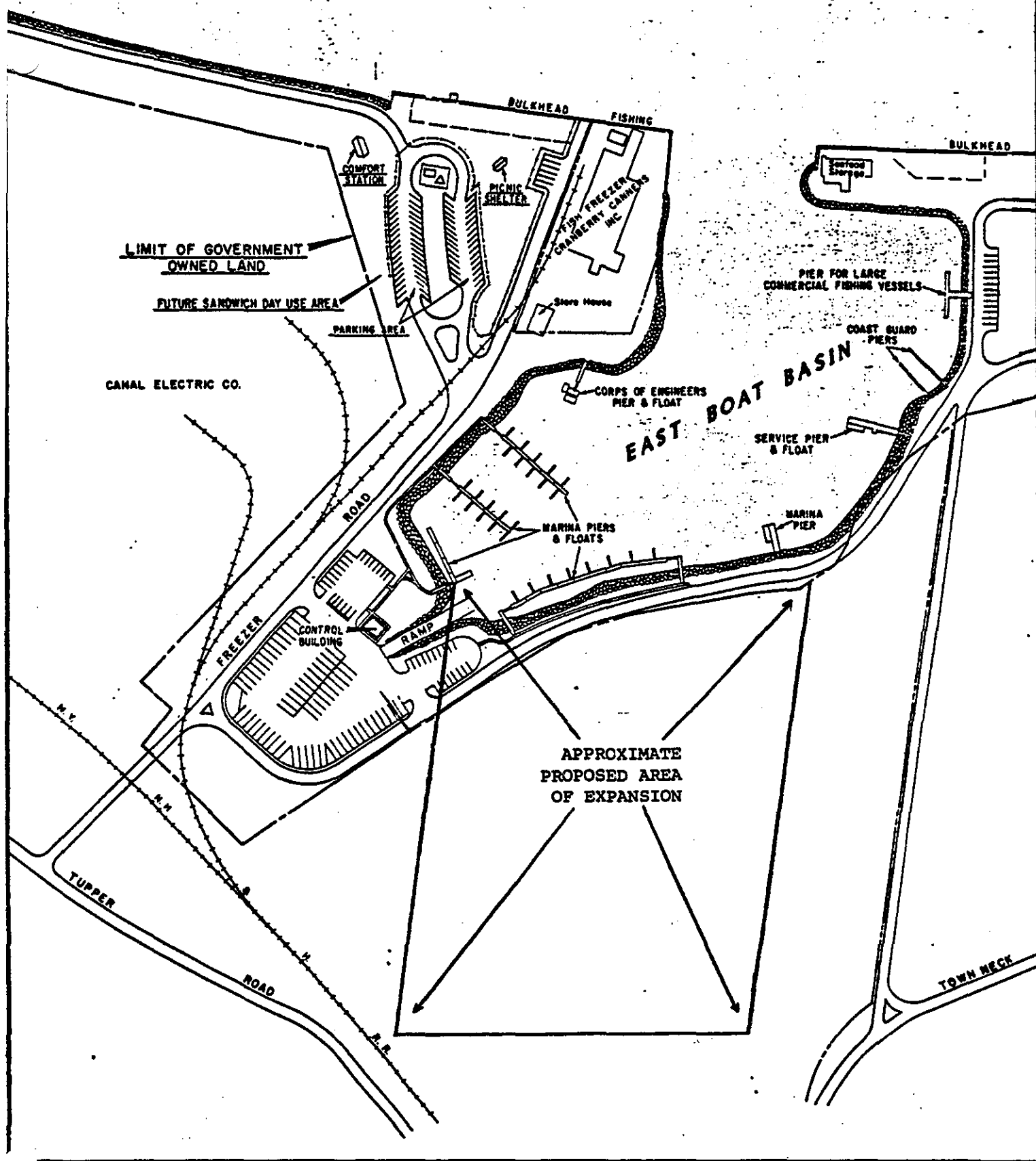


FIGURE 1: GENERAL RELATIONSHIP OF PLAN DEVELOPMENT STAGES AND FUNCTIONAL PLANNING TASKS



7
STUDY CORRESPONDENCE



THE COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION
20 SOMERSET STREET, BOSTON 02108

PUBLIC INFORMATION OFFICE
727-5215

July 14, 1980

Max B. Scheider, Colonel
Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Mass. 02154

Reply NEDPL-C

Dear Colonel Scheider:

The East Boat Basin project in Sandwich, Massachusetts, as outlined in your announcement of 7 July 1980 is of interest.

The expanding commercial fishing fleet is in need of harbor refuge of this type.

The ever growing numbers of recreational boats, when traversing the Cape Cod Canal, have use for this facility.

It is wise to keep in mind the possibility of contaminated dredge spoil being moved about, especially if marinas or marine railways have been in place over an extended period of time. Boat paints contain lead!

As the requirements regarding sewerage holding tanks aboard recreational vessels are enforced, the facilities for pumping-out become more important and the type and size involved is a critical component of this type boat basin. This will have an environmental impact on the contiguous land area or the treatment facility of the town.

Thank you for the opportunity to respond to your announcement.

Sincerely,

A handwritten signature in dark ink, appearing to read "Albert A. Swanson".
Captain Albert A. Swanson
MDC Historian



The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02346

ANTHONY D. CORTESE Sc. D
Commissioner

PAUL T. ANDERSON
Regional Environmental Engineer

July 15, 1980

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

RE: Navigation Study for East Boat Basin,
Sandwich, Mass. - NEDPL-C

Dear Sir:

The Department of Environmental Quality Engineering, Southeast Regional Office, Division of Wetlands Protection, has reviewed the above-referenced project and would like to submit the following comments.

Although it appears from the July 7, 1980 Announcement that the proposed expansion of the East Boat Basin will involve primarily upland areas this office would like to bring to your attention the Massachusetts Coastal Regulations which were promulgated pursuant to Massachusetts General Laws, Chapter 131, Section 40, the Wetlands Protection Act. Certain Sections of the Regulations (i.e., Land Under the Ocean, Salt Marshes, Land Containing Shellfish, etc.) may apply to portions of the proposed work.

Please keep this office informed during the various planning stages so as to avoid any environmental conflict at a later date.

Thank you for your cooperation in this matter and if you should have any questions, please contact this office at 947-1231, ext. 224.

Very truly yours,

For the Commissioner

Paul T. Anderson, P.E.
Regional Environmental Engineer

A/jt/JB

cc: Conservation Commission

Michael Penny, CZM

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



P.O. BOX 660
SANDWICH, MASSACHUSETTS 02563
TELEPHONE 888-0187

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

July 23, 1980

Mr. Robert MacDonald
Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Mr. MacDonald,

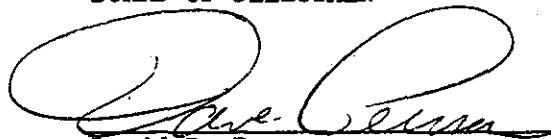
Some time ago, we discussed a chart which would show graphically what steps the Town of Sandwich has to pass through in order to accomplish construction of the East Boat Basin.

This chart will hopefully delineate both methods of funding and the resultant change in steps necessary. This chart would be very beneficial to us in both planning and keeping abreast of what we, the Town of Sandwich, have to accomplish in the years ahead.

Thank you for your assistance in this matter. We look forward to hearing from you in the future.

Very truly yours,

BOARD OF SELECTMEN



David P. Persson

DPP/jb

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



P.O. BOX 660
SANDWICH, MASSACHUSETTS 02563
TELEPHONE 888-0187

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

July 23, 1980

Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02154
Attn: Coastal Development/Major Seltz

Dear Major Seltz,

The Board of Selectmen has attempted to distribute as best we can the Navigation Questionnaires and other appropriate forms to the commercial fishermen, recreational boat owners, et al concerned with the East Boat Basin.

We have also notified the public through the media that forms are available in our office.

We will be glad to assist in collecting further data once the smoke has cleared and people who are going to return forms have done so.

We look forward to hearing from you in the near future.

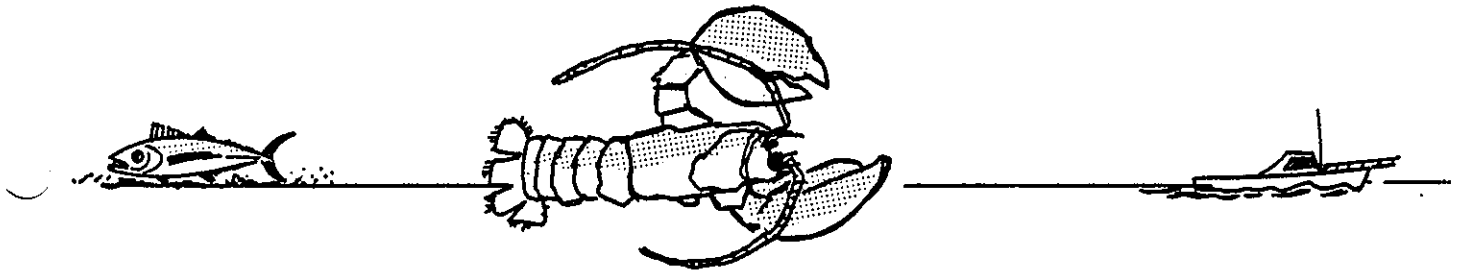
Very truly yours,

BOARD OF SELECTMEN

A handwritten signature in dark ink, appearing to read "David P. Persson", is written over a horizontal line.

David P. Persson

DPP/jb



LIVING END FISHERIES INC.

Capt. Jim Smith

328-3078

222 HOLBROOK ROAD, QUINCY, MASS. 02171

759-3273

July 24, 1980

DIVISION ENGINEER
U.S. CORP. ENGINEERS
N.E. DIVISION
424 TRAPLO RD
WALTHAM, MASS.

DEAR MR. ABCOWER:

I WOULD LIKE TO RECIEVE A COPY OF THE SURVEY INFORMATION
RECENTLY POSTED AT THE LOCAL POST OFFICE'S TITLED:

"CAPE COD CANAL BOAT BASIN" # NEDPL-C DATED
7/7/80 SANDWICH BOAT BASIN.

I AM INTERESTED IN THIS EXPANSION PROPOSAL AND I WOULD
LIKE TO KEEP-UP TO DATE ON ITS FUTURE.

THANK YOU,

James E. Smith

July 30, 1980

Division Engineer
U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

I am writing with regards to the Navigation Study for the Expansion of the East Boat Basin at Sandwich on the Cape Cod Canal.


I am a recreational boat owner and have had a boat at the Sandwich Marina for about 12 years now. During this period I have seen the number of pleasure craft, as well as commercial fishing vessels increase many times, with the results of causing gross overcrowding of the facilities to the point of it being unsafe now when trying to approach your slip. On weekends, especially, there are as many as 27 boats anchored in the Harbor of Refuge, and of course, this is stretching the available space beyond its normal accommodations. There are times when the fishing vessels extend out beyond the exit and approach channel for the Coast Guard vessels and cause serious impedance to their safety missions.

The area needs to be expanded to include more facilities for larger craft of both fishing and recreational purposes. Sandwich is a natural jumping off point for boats transiting the Canal and headed to the North. The towns people would greatly benefit from the increased facility.

The anchorage needs to be swept and increased to a minimum of 12 feet. On Saturday, July 26, 1980, the ENCHANTRA, a 67' ketch drawing 19 feet grounded at MLW in the middle of the Harbor of Refuge.

The expansion program is needed desperately both for the safety of existing recreational and fishing vessels, and also for the increase in fishing activity which is necessary to the economic growth of the town.

Very truly yours,


Wallace S. Morrow III
Master, SS OGDEN CHAMPION
Yacht, PHOENIX



Sandwich Water District

72 TUPPER ROAD, BOX 600
SANDWICH, MASSACHUSETTS 02563

July 30, 1980

Division Engineer
U. S. Army Corps. of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

Re: East Boat Basin

Dear Colonel Scheider:

Enclosed is my response to your questionnaire regarding the East Boat Basin:

What kind of improvements and difficulties:

I believe that the present harbor is too small for pleasure boats, we could use at least twice as many docks, rack storage could supplement some of the needs of the families who only use their boat on weekends. Parking for the present harbor and the launching ramp is inadequate and over crowded.

The commercial fishing fleet only has one dock to tie up at, which at numerous times during the year it is not uncommon to see twenty to forty draggers tied side by side. If one boat, say should sink or catch fire the damage would be in the millions of dollars, a loss most of our local fishermen could never recover from. At these times when the weather or whatever forces the draggers in, the present Coast Guard rescue boats have been blocked off, which means time delays which could possibly mean life or death to the person or people waiting the arrival of the rescue boat.

The one dock that the lobstermen have serves about two dozen fishermen, which means costly delays in loading and unloading for these local men.

At present the fishermen have only one place to sell their fish and only one place to see their lobsters. Some of the small fishermen haul their catches to Hyannis, 17 miles one way or to Buzzards Bay, 8 miles one way.

We have only one gas dock which in the summer season if you are able to fuel up in say one hour you are lucky.

To sum up:

1. At least double the size of the harbor.
2. Increase the parking.
3. Provide dock space for commerical fishermen.
4. Bulkhead for additional space.
5. Provide space for additional services such as fish processing plants.
6. Rack storage for the smaller pleasure boats.
7. Improve the Coast Guard dock space.

Fishermen:

I am not a fisherman but would like to comment on a couple of items I feel are important. The draggers unloading at the bulkhead on the canal are frequently damaged when the wake of other boats force their boat into the pilings while they are unloading at the only place in Sandwich. Supplies for these men must come from New Bedford (about 35 miles one way) and for major repairs it is a long trip to Boston.

Recreational Boats:

Yes, I own one with my father, it is a Pen Yan, 20 foot, worth about \$5,000.00 moored in the present Sandwich Marina dock, used approximately 100 days a year. The improvement would mean less down time thereby we could use it more often. With the cost of dock space about \$1,500.00 per year, the cost of repairs would go down by having repair/service available.

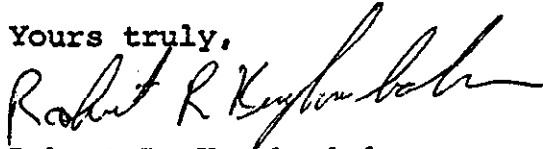
I don't own a business but the enlargement will provide jobs for the Town which is greatly needed in Sandwich. Economically the enlargement would have a far reaching effect on the community, not only by providing jobs and aiding all boaters, but also by enticing new business into the Town, more fishing boats, fish related business and it has to improve/increase the volume of business for all existing businesses. I would be willing to have Sandwich spend money for these improvements. The amount spent would be returned 100 fold to the Town with the benefits that the whole Town would realize economically from the increased fishing industry and pleasure boats.

I would like to thank you for allowing me to be of assistance to you in this very important stage of the planning of, hopefully our newly enlarged Boat Basin.

3.

If I can be of any further assistance, please feel free to call upon me.

Yours truly,

A handwritten signature in cursive script, appearing to read "Robert R. Kreykenbohm".

Robert R. Kreykenbohm
Superintendent
Sandwich Water District

RRK/su

cc: David P. Perssons
Selectman, Town of Sandwich

Plankton Nets

888-1896

T. E. YOUNG

Rt. 130
Box 101
Sandwich, Ma.
02563

Oceanographic Equipment

Steel Fabrication

888-0442

August 5, 1980

Max B. Scheider, Colonel
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

East Boat Basin
Sandwich, MA

Dear Colonel Scheider,

I greatly appreciate the opportunity provided by the Corps of Engineers, for people directly involved with boating to express their opinion. I am fifty-one years old and have been continuously involved with boats, commercial and pleasure, since childhood. I was born in Hyannis, where my father had a machine shop and two marine railways with repair and building facilities. I have been doing welding and repairing on commercial and pleasure craft and shore facilities in Sandwich since 1947. I have also built a fifty foot, forty-one ton, gross, steelmotor sailer for commercial use and is documented for research and fishing. This boat is in the basin now.

It is with this background that I would like to offer these suggestions and observations on the present harbor and the proposed expansion.

I think a major consideration should be the projected usage - given the fuel situation. A reasonable assumption is that pleasure craft usage will decline while commercial fishing changes to include some deep draft sailing and coal fired steam vessels. The existing harbor should be bulkheaded and future expansion bulkheaded except for ramps and railways.

Railways are in urgent need. The use of mobile rige for hauling larger vessels is dangerous and damaging. Large bollards should

be installed on the shore for commercial vessels in tying up and springing off when getting under way. A solid surface, not necessarily paved, should be provided adjacent to the bulkheads for work on nets, dredges, wire ranging, leading and unloading trucks etc.. Provisions for competitive repairing, refueling and provisioning should be made. A harbormaster with a marine background comparable with the projected usage as a commercial port and harbor of refuge should be strongly considered.

Attention should be paid to the commercial facilities of such ports as New Bedford, Gloucester, and Point Judith as a lot can be gained and learned from their many years of practical experience and this knowlege can be applied to Sandwich.

Provisions should be made for the maintainance and repair facilities to reduce replacement costs and to better insure the safety of people and boats.

Sincerely,

Theodore E. Young
Theodore E. Young



COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

August 6, 1980

Colonel Max B. Scheider
U.S. ARMY CORPS OF ENGINEERS
424 Trapelo Road
Waltham, Mass. 02154

Dear Colonel Scheider:

We are pleased to offer our full support for the Initiation of a Navigation Study for East Boat Basin, Sandwich, Massachusetts. We feel that the "Feasibility Study-East Boat Basin Expansion, Sandwich, Massachusetts" (Tibbetts Engineering Corp., April 1979, for the Town of Sandwich) provides excellent initial documentation that the navigation improvements can be economically justified and that there is widespread public acceptance of the concept. The Tibbetts Report cites that an initial investment of \$16 to \$19 million dollars could yield a benefit cost ratio of 5.6 to 1 and could result in a threefold increase in fish landings at the East Boat Basin (pp. 1 and 42-48).

Furthermore, Policy 14 of the Massachusetts Coastal Zone Management Plan provides conceptual support for the study and solution of fishery related problems. Policy 14 reads in part:

"Encourage and assist commercial fisheries research and development, restriction and management of fisheries resources..."

We might note that this Policy provided us with the initiative to partially fund the referenced study of the East Boat Basin expansion.

As you know, other MCZM policies present conditions for the conduct of various activities affecting marine resources. We expect to be closely working with you during all stages of the Navigation Study to ensure that final plans for the East Boat Basin are consistent with CZM policies dealing with construction in or modification of coastal resources and dredging and disposal.

Finally, several CZM staff members are very familiar with fishery management and resource development issues in Massachusetts. During the next several weeks they will be searching for and gathering together information that may be useful to you in Phase I of the Navigation Study. At any time during your study, you or any of your staff are welcome to call on us for consultation or specific assistance. Mr. Michael Penney of our staff will be happy to coordinate any such requests.

Sincerely,

A handwritten signature in dark ink, appearing to read "Ed J. Reilly", written in a cursive style.

Edward J. Reilly
Assistant Secretary

EJR/MEP:dc

cc: Bill Taylor, Town Engineer, Sandwich
Marta Braiterman, Regional Coordinator, CZM

E.T. MOFFITT

CORPORATION

MANAGEMENT CONSULTANTS
BUSINESS MANAGEMENT

68 Town Neck Road

Sandwich, Massachusetts 02563

Telephone 888-1059

August 7, 1980

Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02154

RE: Navigation Questionnaire

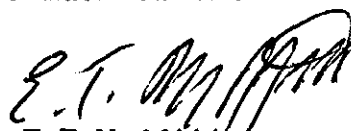
The depth in the basin is not sufficient at low water for deep draft vessels. 12 ft. to 16 ft. is needed for draggers and keel sailboats.

The Sandwich Marina is leased from the U.S. Corp of Army Engineers. Facilities at this time, a launching ramp, slips for boats from 16ft to 50 ft. with 12 slips open for transient.

At present we hold reservations for all slips thru Labor day. Our permanent slips have a waiting list dating back to 1973 totaling 233 applications. All slips are filled in the Winter season by pleasure boats or fishing draggers. Facilities for fishing draggers and lobstermen are very inadequate.

There is no space left for any lobster boats to tie to the shore and anchor off. Commercial boats are forced to tie to one pier and raft off in two rows as much as 15 or more deep. There is no water or electricity available. Unloading must be done at the bulkhead on the Cape Cod Canal. When weather blows hard out of the N W to N E draggers swing and block the Coast Guard dock. Winds out of the S W swings them to the riprap

Every year more draggers attempt to tie to the pier creating a serious problem. The dredging of the basin along with additional berths to tie up will eliminate much of the problem.


E.T. Moffitt

Harbormaster
Sandwich Cape Cod Canal Marina

LANDING INFORMATION SHEET
(For Use With Navigation Questionnaire)

Please cross out those of the following which do not apply:

~~Commercial Landing~~

~~Public Landing~~

~~Recreational landing~~

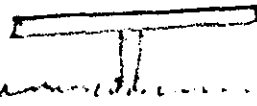
Name of Landing *Sandwich EAST BOAT BASIN Commercial Dock*

Owner(s) *U.S. Corp of Army Engineers*

Location *Sandwich EAST BOAT BASIN Sandwich 10844*

Type of Construction *Piles with wooden deck*

Dimensions *100' Long*



Depth and length of berth(s) *RAFT to pier 10-12 + deep 2 Rows*

Kinds of unloading facilities *Bulk head on Cape Col (Pier 1)*

Kinds of storage facilities *NONE.*

Is railroad siding available? Yes ☐ No ☒

Is truck access available? Yes ☒ No ☐

Is Water available? Yes ☐ No ☒

Is fuel available? Yes ☒ No ☐

What wharf fee is charged? *NONE*

If landing is only partly open to public, explain. *Pier is open to COMMERCIAL DRAGGERS and Lobster Boats only. 17 Lobster Boats Tie To the shore with Stern Anchor out in the Basin. Number of boat owners or shipping concerns using landing or pier up to 30 AT PIER - None using Bulk head on the CAPE!*

What is condition of landing? Excellent ☐ Good ☐ Fair ☒ Poor ☐

Incl. No. 1 to Navigation Questionnaire No. 2

4-26-71

BOAT YARD INFORMATION SHEET
(For use with Navigation Questionnaire)

Name of Boat ~~TYPE~~ *ALAN* *Sandwich (G+P) Cad. Paint (HARRIS)*

Owner(s) *Lease U.S. Govt to Town of Sandwich*

Location *EAST BOAT DOCK*

Size of boats that can be serviced *To 50'*

Number of railways

Capacities of railways or Launching equipment *HAULING / Launching Service*
TRAILER TRAILERS

Kinds of repairs and servicing available *All Services Available on Site*
by independent Service People - RE Hauling - Engine Repairs -
Electrician, Wood, Fiberglass, Paint, Hull work

Number and size of boats that can be stored

Covered

Open *50+*

Berths *80*

Moorings

Average number of boats serviced last year* *40-50*

Average number of boats stored last year* *102*

Approximate average gross valuation of business last year*
*Dockage and Winter Storage plus Fuel *200,000*

*Have these figures changed during the past five years?

Explain. *Yes increased from \$70,000 To \$200,000*

We have on hand 232 Applications for Berths dating back to 1973 which we cannot process because of lack of space.

Incl. No. 2 to Nav. Questionnaire No. 2

40 Grove St.
Sandwich, Mass 02563
10 Aug 1980

Dear Sir,

A few brief comments in response to the Navigation Questionnaire for the East Boat Basin, Sandwich.

If possible at the expense of the Federal Government more fishing interests would make use of this area. I would encourage it. However, what would the rental of slips be, who would get that money?

Under no circumstances should Town money be spent to benefit recreational boaters. I do not think the taxpayer should be burdened by something that would only benefit a few, and most of them not town residents.

Time does not allow me to respond to this subject further.

If in the future you have further questions I would be glad to comply.

Sincerely,
John G. Stein
John G. Stein

**SANDWICH
CAPE COD CANAL
MARINA**

BOX 152 SANDWICH, MASS. 02563
TEL. 888-2500

August 18, 1980

Planning Division
New England Division
Corp. of Army Engineers
424 Trapelo Road
Waltham, Mass. 02254

Re: Permanent and Transient Slips
Sandwich Marina

Length of Slips	out board	in board ^(STERN)	power ^(IN-BOARD)	sail	Trns.	Total	on file	oldest Date
Boats up to 20'	20	1			1	22	62	May 72
" 20 to 24'	1	4	13	1	3	22	56	Apr. 72
" 25 to 28'			9		1	10	51	June 72
" 29 to 33'			12		2	14	27	May 75
" 34 to 40'			7		5	12	19	Aug 73
" 41 to 43'			4		2	6	12	Aug. 73
" 44 to 50'			4			4	8	June 74
TOTAL	21	5	49	1	14	90	235	

1979 A total of 733 transients used slips some overnight others a week or so.

1980 To date 8/17 537 transients used slips with advance reservations filling all transient slips thru Labor day and some thru Oct. 15.

This past week alone we were unable to accomodate 42 boats that asked for slips without reservations.

The harbor of refuge sometimes fills to capacity with up to 50 boats at anchor. (see photo)

E. T. Moffitt

Sandwich Harbormaster

cc Selectmen Town of Sandwich



The Commonwealth of Massachusetts

Division of Marine Fisheries

~~Lowell State Office Building~~

~~100 Cambridge Street, Boston 02102~~

Philip G. Coates
Director

18 Heritage Professional Building

Route 6A RFD 1, Sandwich, MA 02563

August 25, 1980

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

We, the Cape and Islands Area Team of the Massachusetts Division of Marine Fisheries, have been requested by the Sandwich Board of Selectmen to respond to the Initiation of a Navigation Study, East Boat Basin, Sandwich, Massachusetts.

Rather than answer the specific questions posed on the navigation questionnaire, along with several information sheets, we have composed a status report on commercial fishing activities in the Sandwich Basin. Our report encompasses information pertinent to Stage 1 investigations.

If we may help to provide any further information, please contact us in Sandwich.

H. Arnold Carr, Marine Fisheries Biologist
Elizabeth Amaral, Assistant Marine Fisheries Biologist

Elizabeth Amaral

CC to: J. Fair, Assistant Director
Board of Selectmen, Sandwich

Sandwich East Boat Basin Commercial Fisheries Status

The Sandwich East Boat Basin is one of four major fishing ports on Cape Cod. In terms of pounds of fish landed and associated value on Cape Cod, Sandwich has ranked second to the port of Provincetown over the last three years; overall in Massachusetts, Sandwich ranks fifth in landings. In 1975, the first year for which complete landings are available, 6,383,000 lbs of fish were landed with a value of \$1,753,000 (Table 1). In 1979, 17,488,000 lbs were reported, valued at \$9,848,000. This does not include swordfish (Sandwich being a major swordfish port on the East Coast) at an estimated value of \$2 million (pers. comm. Fed. Port Agent). Principal species landed are yellowtail flounder, winter flounder, cod, haddock, sea scallops, and lobster (both from pots and draggers). Canal Marine, the Cape's largest freezer facility, is a major offloading site for sea herring, menhaden and squid. In the month of September, Sandwich becomes a center of activity for two tuna seiners. Their high priced catch is processed for direct air shipment to Japan. As recent economic studies show¹, these landings generate a value to the local economy that may reach four times the landed value, before the fish reach retail markets. If this can be applied to Sandwich, this may mean a value to the community economy approaching \$68 million.

The number of commercial vessels which call Sandwich "home" on a year-round basis fluctuates between 17 and 20. They are principally inshore draggers and sea scallopers, collectively in the range of 30-50'. The inshore commercial lobster fleet numbers 17-18 boats (1980) during the spring through fall. During 1979-80 six sea clam boats (with hydraulic dredge) have periodically made Sandwich their base of operation, working nearby clam beds in Cape Cod Bay.

Several of these boats are from Rhode Island. The size of the dragger fleet, although having a "core" of Sandwich vessels, fluctuates with the seasons and fisheries, such that vessels from Plymouth and New Bedford, for instance, may remain here up to several months if fishing is favorable nearby and/or weather dictates moving from their home port. These commercial vessels must raft (tie off, one to the next) together in two rows which has meant as many as 20 vessels per row, 40 vessels total, extending from the commercial dock to the entrance of the Basin. The lobster fleet utilizes moorings just off the rip-rap in the summer. When the recreational fleet leaves the inner Basin in late fall, the commercial vessels occupy the vacated slips (up to 50 additional vessels); this is a common phenomenon on Cape Cod in the winter months when competition for dockage decreases.

The transient fishing fleet is peculiar to the Sandwich Basin in that it utilizes the port principally for offloading (at one of four fish dealers along the Canal) and less for layover, supplies or refueling. At least 50 vessels offload at the Atlantic Coast Fillet Co. in the course of a year, coming from Sandwich, New Bedford, Westport, Scituate and occasionally, Martha's Vineyard, Rhode Island and North Carolina. This figure is based on those fishing craft which offload routinely there, but are not company-owned vessels. A new fish company, occupying the building furthest east on the bulkhead, will shortly have its own vessels fishing and landing (3-4) in addition to transients. At Canal Marine, large (up to 70') purse seiners and pair trawlers from New Bedford, Rhode Island and Hyannis offload herring during late fall and winter. Throughout the rest of the year, redfish and herring are trucked to Canal Marine freezer from other New England ports. Joe's Lobster Mart is a major lobster retail/wholesale facility which serves inshore and offshore lobster fleets.

Commercial attraction to the East Boat Basin can be summarized by the following:

- 1) It is a deep water port capable of unloading and docking fishing vessels with a draft more than 15 feet and 10 feet, respectively. (However, unloading can only take place along the outer bulkhead). This harbor of refuge can be considered a deep water port by Cape Cod standards and is one of three on the Cape.
- 2) Its virtually ice-free access and condition during the winter have permitted fishing operations to continue when most other ports are closed.
- 3) Its close proximity to productive fishing grounds, both on the north and south side of Cape Cod, allows the vessels to fish for species available throughout the year as well as those available seasonally.
- 4) It is a convenient, sometimes central, location for vessels transitting between other ports and the fishing grounds. This is reflected in the large number of transient vessels that unload here (mentioned above).

Despite the commercial attraction to the Basin, problems do exist for both transient and home-port vessels of the commercial fleet. For the latter, the existing commercial dock serves no purpose other than a "support" on which to tie the first vessel in line for rafting. It rarely serves as an offloading dock, due to its size and inaccessibility in this rafting situation. At best, it can be used by the fishermen as a platform to board their craft. Loading and offloading gear or other heavy equipment as well as refueling must be done along the outer bulkhead in the canal, unless vessels buy fuel at the Basin fuel dock.

The rafting situation is dangerous although it is presently the only form

of 'docking' for the larger commercial vessels. As mentioned previously, as many as 20 boats have tied together causing potentially hazardous navigation in the Basin, vessel damage and blockage of the Coast Guard's path. Rafting pressure increases during inclement weather, particularly in winter when the Basin is used for refuge.

More transient craft might utilize the Basin if it were not for the overcrowded conditions, coupled with basic lack of facilities - no railway, no repair shop or chandlery. Although exact figures are not known, many fishermen have made it clear they would move to Sandwich permanently if conditions were more inviting.

Even offloading is a problem: the outer bulkhead where unloading takes place is exposed to the hazards of high winds and seas. Vessels may tie up there for only short periods of time. Increased and protected offloading space to accomodate more than one vessel at a time would be desirable. We do feel, however, that the fish companies should speak out individually on this matter.

These conditions depict the present status of commercial fishing activities in the Sandwich Basin combined with input from the commercial sector. The Basin presently provides a limited facility for the commercial fleet. We feel that minimum improvements should encompass the following:

- 1) Increased and adequate docking space, to include bulkheading.
- 2) Multiple as well as protected offloading space.
- 3) Commercial support facilities.

¹King and Storey. 1974. Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustrations of the Cape Cod Region. U-Mass. Publication No. 40 Special Report.
Callaghan and Comerford. 1977. Modified Regional Input-Output Analysis of Rhode Island Commercial Fishing and Related Activities. New England Journal Bus. and Econ. 3(2).

Table 1.

Sandwich - Commercial Landings

Year-End Totals, 1975-1979

	<u>Pounds</u>	<u>Total Landed Value</u>
1975	6,383,000	\$ 1,753,000.
1976	11,845,000	4,359,000.
1977	15,340,000	5,045,000.
1978	19,021,000	7,778,000.
1979	17,488,000	9,848,000.

Federal Fishery Statistics



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. Box 1518
Concord, New Hampshire 03301

SEP 08 1980

Colonel William E. Hodgson
Deputy Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Hodgson:

This letter is intended to aid in your planning of navigation improvements for the East Boat Basin at Sandwich, Massachusetts. It is submitted under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The East Boat Basin is seven acres in extent and located on the south side of Cape Cod Canal near its eastern end. Spoil from the 1964 dredging of 4.3 acres to a depth of 8 feet was placed on the south side of the harbor. The original 2.7 acres of the harbor was dredged to a depth of 13 feet and the spoil was placed on a disposal site located offshore from the eastern end of the canal.

We understand the current study is to determine the Federal Government's interest in participating in a harbor enlargement using 11.1 acres of town-owned land for excavation of additional space for commercial fishing boats and a contiguous lot of 11.4 acres for support facilities. Excavation of about a million cubic feet is expected. The town-owned lots include the old spoil area. The existing harbor will be dredged to a depth equal to the depth chosen for the new area but not exceeding 16 feet. Disposal of dredged spoil at the offshore site used for the previous spoil and disposal of excavated material from the old spoil site at upland locations is being considered.

Dredged material from the harbor should be subject to core sampling, bulk sediment, and elutriate tests to determine (a) the relative proportion of sands, gravels and silts, and (b) its level of contamination. Use of the harbor by large numbers of boats may have resulted in deposits of metals such as copper, lead and zinc from paints scraped from and applied to boat hulls and from other boat-related sources.

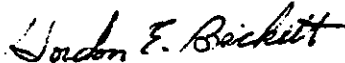
A survey of benthic organisms will be necessary to determine the biological activity on the harbor substrate, since we have found no publications on benthic species in the harbor. There is no shellfishing. The large number of boats crowded into the harbor could be limiting the benthic community. Finfish such as menhaden, mackerel, cunner, and other species enter the harbor at various times but the harbor is not considered significant habitat for these species.

A wildlife community has developed on the old spoil site which has a general elevation of about 11 feet above mean high water. The vegetation is dominated by grasses tentatively identified as Spartina spp., other unidentified grasses; shrubs such as bayberry, sweet gale, poison ivy, and other species. A narrow band of deciduous trees is located along the railroad tracks at the south end of the spoil site. Habitat for small mammals, songbirds, and possibly shorebirds is provided at the site. The quality of this habitat and identification of resident, nesting, and transient species of songbirds and transient or resident mammals needs to be determined so that an evaluation of habitat losses and possible mitigation measures can be accomplished. Therefore, your studies should include funds for a detailed evaluation of the vegetative and wildlife communities. We have found no reports concerning terrestrial habitat at this site.

Your study also should include consideration of beneficial use of the spoil from the harbor so that offshore disposal can be avoided. In addition, the frequency of future maintenance dredging should be determined in your studies as well as selection of a site or use for maintenance spoil.

The Massachusetts Division of Marine Resources plans to conduct finfish studies at a number of potential sites for the disposal of spoil including the site proposed for this project. These studies will start this fall and are being done under the auspices of the Massachusetts CZM program and will include benthic investigations. These studies should provide information on the biological communities existing at the proposed spoil site.

Sincerely yours,



Gordon E. Beckett
Supervisor

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



SANDWICH, MASSACHUSETTS

TELEPHONE 888-⁰¹⁵⁷2222

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

October 3, 1980

Dirk Zwart, Project Manager
Sandwich East Boat Basin
U.S. Army Engineer Division
New England Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Mr. Zwart,

The Board of Selectmen would like to thank you for this opportunity to respond to Navigation Questionnaire Form #2 concerning the proposed expansion of the East Boat Basin.

You have been provided with various information concerning the fish landings, commercial facilities, commercial boat numbers, recreational boat numbers and a whole assortment of required statistics. What I propose to do is provide a general overview of the project as seen by the Board of Selectmen.

1. DESCRIPTION OF IMPROVEMENT WANTED. The purpose of the expansion is to promote and facilitate commercial fishing from the port of Sandwich. Presently Sandwich ranks fifth in Massachusetts in total fish landings. What is desired is to expand the present harbor facility utilizing a 22 plus acre site which has been acquired by the Town of Sandwich. Through the Coastal Zone Management Program, we have completed a very preliminary study as to what the Town would see as a desirable expansion. This report, prepared by Tibbetts Engineering, is enclosed. You will please note there are two different proposals for improvement. We are certainly open to proposals that accomplish our declared goal. The Town relies upon the expertise of the Corps of Engineers in designing the actual site, maximizing the Corps participation in the project. I think you will find that the Tibbetts report is a reasonably complete view of the project, but please bear in mind that our main intent for the expansion is commercial fishing.

2. DESCRIPTION OF PRESENT NAVIGATION DIFFICULTIES. Presently the four fish handling facilities are located on the banks of the canal; therefore, boats must be tied up in the canal and offloaded, presenting navigational problems as well as a hazardous condition. Moreover, on the interior of the present harbor there is one pier for commercial fishing boats. The pier, designed for six, presently handles in excess of 35 boats. During the winter months when the recreational fleet is removed from the present harbor facility, the commercial vessels occupy those existing slips and still continue to raft off this one pier. Thus, we are left with two distinct difficulties:

- a. Offloading in the Cape Cod Canal of fishing boats to handling facilities.
- b. A grossly overcrowded facility for commercial vessels.

3. LANDING AND SERVICING FACILITIES IN THE HARBOR.

- a. Commercial Landings. There are presently four fish handling facilities located on the banks of the canal (see attached form).
- b. Recreational Landing. Presently there is one boat launching facility in the East Boat Basin.
- c. Public Landings. The recreational landing described above also functions as a public landing. We would sincerely hope that in the new expanded facility increased public access would be achieved as the present landing is grossly over-used.
- d. Boat Yards and Repair Facilities. There is presently no boat repair facility on site. We would propose that in the final site preparation, that land be provided for such a facility.
- e. New Facilities Planned. With the proposed expansion we propose to create several fish handling facilities for off-loading within the new harbor. Moreover, we intend to have provided rack storage for recreational boats. Again, please consult the Tibbetts Report. It gives a general idea as to what type of facilities we will be striving for.

4. PRESENT USE OF THE HARBOR.

- a. Fishing Industry. You should find that the Massachusetts Marine Fisheries has responded with great depth, providing you with adequate information in this area. We will be happy to provide any additional information.
- b. Recreational Boating. The Harbormaster has provided your office with detailed information as to the extent of recreational boating. Again, if further information is needed, please contact us.
- c. Charter Boats. Presently there are none at the existing facility and we are undecided as to whether they will be included in the final facility.
- d. Ferries. None.
- e. Other Commerce. None.

- f. Special Problems. There is a special condition not necessarily a problem which exists at the East Boat Basin. The outfall of warm water from Canal Electric into the Cape Cod Canal occurs 400 yards to the west. This water tends to prevent the boat basin from icing. We would propose in the facility that a conduit be constructed from the canal outfall to the East Boat Basin, connected to perforated pipe which would lie at the bottom of the facility. Further, this conduit would be flooded with warm water in late Fall and shut off in early Spring, thus aiding this ice-free feature, yet helping to prevent the problem of ship worms.

5. STORM DAMAGE. The East Boat Basin presently functions as a harbor of refuge, and this of course would be preserved under the expansion program.

6. WOULD YOUR COMMUNITY BE WILLING TO CONTRIBUTE MONEY TO THE IMPROVEMENT OF THE HARBOR? Prior to the involvement of the Corps of Army Engineers, the Town of Sandwich purchased 22 plus acres of land adjacent to the present facility. However, we realize that this commitment is merely just the beginning. There will be expenditures of funds for bulkheading, for site preparation, relocation and location of utilities, and a host of other shore facilities. The funding for the above improvements will be sought through a combination of private and local funds. Thus, the Town of Sandwich is very aware that it must contribute to make the expansion of the East Boat Basin a success. We are currently pursuing additional Federal funds to accomplish adequate site preparation, the first step in an arduous process in obtaining needed funds.

Very truly yours,

BOARD OF SELECTMEN



David P. Persson

DPP/jb

Enc.

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



SANDWICH, MASSACHUSETTS

TELEPHONE 886-4200

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

January 19, 1981

Colonel William E. Hodgson, Acting Div. Eng.
Department of the Army
New England Division, Corps of Engineers
Waltham, MA

Dear Colonel Hodgson,

The Sandwich Board of Selectmen would like to express their sincere appreciation for having this opportunity to review the Reconnaissance Report of Navigation Improvements for the East Boat Basin, Sandwich, Massachusetts. We find that the report has captured the critical nature of the existing problems with respect to commercial berthing and off-loading. Moreover, you have analyzed the critical economic problem Sandwich faces -- unemployment. It should be noted that the unemployment problem, clearly at its worst during the winter months, remains considerably higher during the summer months than Barnstable County or indeed the Commonwealth of Massachusetts.

We would like to emphasize three points concerning the expansion of the East Boat Basin. First, the Board of Selectmen wish to place clear and definite emphasis upon commercial fishing within the expanded area. Recreational interests, we feel, can best be accommodated through the use of rack storage for smaller power boats and a better layout of slip space using the existing water space.

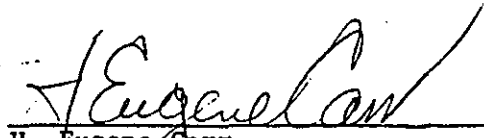
Second, we would like to point out that the Tibbets Report and the two layouts of expansion, are merely guides to indicate our interest in expansion. They should not be regarded as definite and absolute proposals, rather as tools to express our desires.

And third, it is essential that federal dollar participation in this project be maximized for this plan to succeed. The Town of Sandwich with its \$7,000,000. budget cannot afford a great share of the cost of "digging the hole". We understand clearly our financial responsibility concerning the bulkheads, piers, and docks, as well as the site preparation. Therefore, we request of the Corps of Army Engineers a design of expansion, commercially directed, which maximizes federal cost sharing.

Again, thank you for this opportunity to discuss these matters with you.

Very truly yours,

BOARD OF SELECTMEN


H. Eugene Carr
Chairman

HEC/jb

4-40

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



P.O. BOX 660
SANDWICH, MASSACHUSETTS 02563
TELEPHONE 888-0157

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

July 15, 1981

Mr. Dirk Zwart
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA

Dear Mr. Zwart,

Thank you for calling this office requesting additional comments regarding the Stage Two Study of the East Boat Basin on the Cape Cod Canal.

You asked how large an area around the basin would receive some impact from this expansion. The 22 acres of town-owned land immediately surrounding the basin of course is the area which will have the greatest development impact. How this area is developed also depends on how large the expansion will be and what type of shoreline - whether it will be rip-rap or bulkheading or a combination of both. We still prefer the bulkheading method to get the greatest amount of useable area for both the basin and the support shore facilities. The town-owned land will be the area the Town will be directly involved in for planning and development.

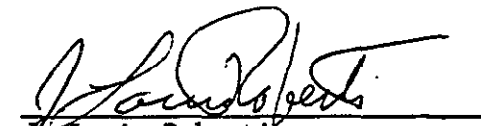
The town-owned land undoubtedly will be all marine related facilities. Some businesses have already been built in the immediate area and many more undoubtedly will follow.

I am enclosing a zoning map of the Town of Sandwich and you can see from the map that the potential for marine related businesses is certainly a possibility.

I hope this answers the questions you raised. Please feel free to call on me on any subject you feel this office can be of help to you during this expansion.

Very truly yours,

BOARD OF SELECTMEN


J. Louis Roberti
Chairman

JLR/jb

Enc.



PHILIP G. COATES
DIRECTOR

The Commonwealth of Massachusetts
Division of Marine Fisheries
Leverett Saltonstall State Office Building
100 Cambridge Street
Boston, Massachusetts 02202

727-3193

November 27, 1981

Mr. Joseph L. Ignazio
Chief, Planning Division
U.S. Army Corps of Engineers, N.E. Division
424 Trapelo Road
Waltham, MA 02254

Dear Mr. Ignazio,

My staff has reviewed your letter of September 1, 1981, requesting information relative to the proposed expansion of the Sandwich Boat Basin. Although some of your questions are rather ambitious in nature, I will answer them to the best of our ability.

The proposed expansion is consistent with our policies for port development in that it is an improvement to an existing port which presently has inadequate docking facilities. If the expansion was merely intended to increase effort in the fully utilized fisheries, or create a new fishing port, it would not be in the best interests of the Commonwealth at this time. However, it is important to note that the Sandwich fleet does not operate in a vacuum, and that these vessels are competing with the other fishing vessels operating off our coast. The addition of vessels to the Sandwich fleet will not mean a large increase in total fisheries effort since most of these vessels will be displaced from other severely overcrowded ports.

The potential for increased landings is difficult to predict given the number of variables to consider. Theoretically the total fishery resources of the Northeastern U.S. are sustainable at roughly 900,000 MT, or three times the present U.S. and foreign catch. However, many of the species currently landed at Sandwich are presently or close to being overfished. The transition to the underutilized species depends on several important changes in the industry. The development of marketing systems and processing facilities, the improvement of quality and handling techniques, the adoption of new and innovative fishing practices, and the development of new domestic markets while increasing exports

all must precede effective utilization of the non-traditional species.

Although the inexactness of fishery science and the variability of stock dynamics make long term estimates of abundance difficult, if not impossible, the following species currently offer the greatest potential for an expanded Sandwich fleet (estimated potential increase in parentheses^I): pollock (47%), silver hake (84%), red hake (86%), mackerel (99%), butterfish (86%), spiny dogfish (96%), Loligo squid (86%), Atlantic herring (62%), sand dab (unknown), and ocean pout (unknown). Prospects for silver hake, herring, and mackerel are contingent on recovery of stocks. Spiny dogfish, ocean pout, and silver hake offer the greatest potential for inshore vessels, which many of the Sandwich vessels will be.

In more general terms the potential for increased landings is considerable, given the trend toward the elimination of quota management and the abundance of the underutilized species. Marketing programs and gear technology programs are already underway, but support facilities, including processing and storage facilities are necessary to complete the picture. Consequently the development of the basin should proceed with increased utilization of these species in mind. This will require a coordinated effort between the Corps, the community, and the fishing industry.

In answer to your question on lobster landings we are able to provide data for 1979, when 124,265 lb. worth \$248,530 were landed, and 1980, when 121,869 lb. worth \$262,018 were landed. Prior to 1979 lobster landings were not recorded by individual port.

I hope this information is helpful to you in your deliberations concerning this project. If I may be of further assistance please contact me.

Very truly yours,



Philip G. Coates
Director

PGC/JF:vf

^ICalculated as percent difference between 1978 U.S. and foreign catch and projected MSY by species stock unit (McBride, M.M. and B.F. Brown, 1980. The status of the marine fisheries resources of the northeastern United States. NOAA Technical Memorandum, NMFS-5/NFC-5.)



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 102ND FIGHTER INTERCEPTOR WING
MASSACHUSETTS AIR NATIONAL GUARD
OTIS AIR NATIONAL GUARD BASE, MASSACHUSETTS 02542

REPLY TO
ATTN OF: FIW/BCE

APR 6 1982

SUBJECT: East Boat Basin, Sandwich, MA

TO: Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254
Attn: NEDPL-C

1. Reference your letter dated 26 Mar 82, subject as above.
2. This confirms the telephone conversation between Mr. Zwart of your office and Mr. Merritt of this office to the effect that the Otis sanitary landfill is for the sole use of base occupants and cannot accept excavated and dredged material from subject project.

PHILIP J. MCNAMARA, LtCol, MaANG
Base Civil Engineer

Readiness is our Profession



PHILIP G. COATES
DIRECTOR

The Commonwealth of Massachusetts

Division of Marine Fisheries

Leverett Saltonstall State Office Building

100 Cambridge Street

Boston, Massachusetts 02202

727-3193

April 13, 1983

Dirk Zwart
U.S. Army Corps of Engineers
Coastal Development Rd.
Waltham, MA 02254

Dear Mr. Zwart;

This letter is in response to requests for information for determining the feasibility of Federal participation in the expansion project at the East Boat Basin, Sandwich, Ma.

Background of East Boat Basin

The basin has supported an active commercial fleet, partly described in letters dated August 25, 1980 and November 27, 1981 and in telephone conversations from this agency to the Corps of Engineers.

The basin is a convenient, centrally located, wellprotected deep-water port having ready access to fishing ground in Cape Cod Bay, Massachusetts Bay, Nantucket and Vineyard Sounds, as well as the back side of Cape Cod and Georges Bank. It should be noted that this location allows a "fair-wind" return with a lee provided by the Cape for the last part of the trip from Georges Bank around Race point or through Nantucket Sound during storms with either southeasterly or northeasterly winds. The basin and at least its northeasterly approach are usually icefree and navigable, allowing fishing operations to continue after other near-by ports have frozen to inactivity. The proximity of the Canal Electric Plant offers the potential of utilizing the heated sea water effluent of the plant by diverting all or part into the basin to insure no freeze-overs in even the harshest of winters. There is convenient access to state highways and the Interstate highway system, and there is an existing rail-road siding on an active East coast trunk.

Present East Basin Problems

There are, however, several major problems with the existing port, the most serious being overcrowding and inadequate berthing. The local fishing fleet and the number of transient and seasonal commercial and recreational vessels using the East Basin exceeds

its capacity to a point that presents dangers and debilitating inefficiencies to those vessels.

Commercial vessels of 70' or less (the basin is too small for anything larger) must tie alongside one another out from the existing small pier as many as 15 deep, often damaging one another as they maneuver into or out of this raft or merely move in the wind and swells. When rafted it is very difficult and sometimes almost impossible for any vessel not on the outside of the raft to leave, and then only with the assistance and cooperation of the crews on adjacent vessels. This is a major undertaking which may take an hour or more to accomplish and can be done only when the other vessels are manned. Thus, there are times when a skipper would like to leave the raft to fish, move, offload, take on ice, refuel, make repairs, etc. but either cannot or doesn't bother to. Through talking to fishermen regularly using the basin, I estimate that productive fishing time lost due to rafting-related problems is 20% during spring, summer, and fall. Damage to vessels resulting from rafting is variable, usually contributing more toward lost fishing time.

Rafting presents other hardships to the fishermen. Carrying gear, provisions, or anything across several other boats is difficult. Crossing unfamiliar decks cluttered with fishing gear in darkness or snow and ice is hazardous. Moving almost anything weighing more than about 100 pounds necessitates first moving the boat out of the raft.

But there is no working bulkhead in the basin where a boat can temporarily tie next to a truck for loading or offloading heavy items. There is such a bulkhead on the canal itself but this is fenced off except at the fish packing house for the offloading of fish. Whenever heavy or bulky items must be loaded or off-loaded, either the vessel must go elsewhere or the equipment be man-handled aboard, a very risky and dangerous method. Service vehicles such as welders, mechanics, carpenters, etc. cannot park next to the boat being repaired, making some tasks very difficult, if not impossible. These difficulties often result in the delay of needed maintenance and repair until failure; a dangerous, expensive, and unnecessary procrastination.

Since there is no off-loading alternative, skippers must sell their catch to and take ice from the company holding the exclusive rights to the single off-loading area. This arrangement assures that there is no effective competition for the catch, and no alternative market for the skipper. Furthermore, the skipper must stay on good terms with this company for the privilege of using that area for moving fishing gear on to or off of the boat.

Taking on ice can be done only when there is no vessel off-loading its catch, resulting in a great deal of productive fishing time lost in waiting for ice before the start of a trip. The inefficiencies due to offloading and icing costs 10 to 15% of possible fishing time in summer and contributes to a lower quality (and therefore lesser value) catch.

The one offloading and icing area is located on the canal itself, subjecting the boats to wakes created by vessels transiting the canal. Since many pleasure boats, USCG patrol boats, the Army corps patrol boat, and many freighters create large and powerful wakes, offloading (where heavy masses swing overhead) can become extremely dangerous very suddenly and without warning.

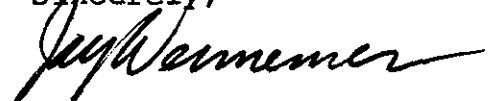
Future growth

Over crowding, inability to handle large fishing vessels, lack of working bulkhead, unloading and icing inefficiencies, and lack of alternative markets for the catch, combine to make the basin less attractive for fishermen presently operating out of other ports. Since other nearby fishing ports such as Scituate, Green Harbor, Plymouth, Provincetown, Woods Hole, and even New Bedford and Gloucester are extremely overcrowded, there is a need from the existing fleet for expanded and improved port facilities. Adequate expansion of the East Boat Basin would attract surplus vessels from these overcrowded ports, helping to alleviate their constipation.

While there will likely be little further expansion in the present groundfish, scallop, and lobster fleets, the opportunities to harvest as-yet underutilized species is real. Substantial markets for herring, mackerel, squid (both *Illex* and *Loligo*) hake (red, white and silver), butterfish, dogfish (both smooth and spiny), and ocean pout are imminent, due to aggressive fisheries development activities by National Marine Fisheries Service, Fisheries Development Foundation, and private groups. Utilization of these untapped seafood resources is important for the growth and health of our fishing industry and, through deficit in our national balance of trade, to the country as a whole.

Due to the lesser value of the underutilized resources, large amounts of these fish must be harvested, handled, and processed in order to make them economically feasible for the harvester and processor. An important but lacking prerequisite is larger and more efficient vessels, offloading systems, processing plants, and berthing-staging areas. As previously mentioned, most Massachusetts fishing ports are already overcrowded and provide for virtually no expansion in the fishing fleet. Furthermore, their facilities are generally obsolete and in need of repair. Expansion of the East Boat Basin would help alleviate overcrowding in several ports, and would provide for imminent growth in the Massachusetts and regional fishing fleet.

Sincerely,



Coordinator, Fisheries
Extension Service

JW/rr

cc: Kevin McKelvey, U.S. Army Corps



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
P.O. Box 1518
Concord, New Hampshire 03301

Colonel William E. Hodgson
Deputy Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

MAY 20 1982

Dear Colonel Hodgson:

This letter is to aid you in your planning for navigation improvements at East Boat Basin, Sandwich, Massachusetts. It is submitted in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). We evaluated the nine alternate plans you are considering for development of the Basin to accommodate more recreation and commercial fishing boats.

Habitat at the site proposed for expansion is characteristic of old spoil sites with relatively poor soils and sparse vegetation. The more conspicuous vegetation is phragmites, bayberry, cedar, and various grasses. There is an extensive habitat diversity because larger trees and brush are located near the railroad tracks. This helps to attract various animals such as raccoons, skunks, and rabbits. It is important for songbirds during the spring and fall migration periods and provides nesting for several species. A list of possible breeding birds is enclosed. There is little permanent or temporary water but enough to attract a few ducks at times. We have tentatively classified this site in Resource Category 3. 1/

We previously advised your staff that a Habitat Evaluation Procedure (HEP) study would be necessary to produce more detailed information on the relative value of this site and any potential mitigation site. We now believe that HEP would not be cost-effective because there is inadequate data on habitat requirements for the species found at the site and because the project is of small scale.

Selection of a site for the spoil disposal is the key to the degree of mitigation that can be achieved. We have located a number of potential sites, which, with the sites you are considering, provide an array of potential mitigation possibilities. All of the potential upland spoil sites have been visited with a representative of the Massachusetts Division of Fisheries and Wildlife. The marine site was selected in coordination with a representative of the Massachusetts Division of Marine Fisheries. All agreed that these sites are worth further study. Further coordination with local authorities will be required when the additional studies are initiated.

1/ Department of the Interior, U.S. Fish and Wildlife Service Mitigation Policy, Federal Register, January 23, 1981, pp. 7644-7663.

Only one of the three disposal sites on your list has potential for habitat mitigation. This is the "stump dump" site located at a sand and gravel pit next to the east side of Route 130 and about one mile south of the junction of Routes 130 and 6. This is essentially a commercial sand pit with no vegetation and it is partly filled with stumps. Placing the spoil here could mitigate habitat losses. The other two sites are located at Otis AFB and at the Town (Sandwich) Highway Garage. Both sites have existing forested habitat, (pitch pine, white oak, red oak) which would be destroyed by filling. The lost habitat could eventually be replaced on the spoil but this would not mitigate the loss of habitat at the Basin.

We have selected a marine disposal site where there is a possibility of creating a tidal flat or a salt marsh. The site could be located somewhere along the north-west (inland) side of Stony Point Dike on the west side of the Canal in Wareham. Detailed investigation of the existing habitat is necessary to determine the species composition and value and to locate a specific site to be filled. The relative value of the existing habitat has to be determined so that its loss can be compared with the potential gain of the new habitat. Successful creation of a salt marsh or flat will most nearly replace habitat buried by the original fill at East Boat Basin. It also would be more valuable than the existing habitat. Therefore, this site is our first choice for further investigation.

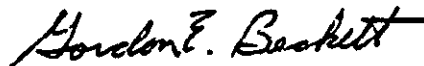
There is one additional site at a vacant gravel pit located on the Crane Wildlife Management area. Because this area is already dedicated for conservation and fish and wildlife management, it would have second priority.

Another area which could provide improved wildlife habitat, plus an opportunity for a public demonstration of habitat restoration is located on Federal land, the Canal Midway Station. Existing vegetation at this site is scattered and is poor wildlife habitat. Placing spoil at this site could mitigate the loss of habitat and provide a public educational facility. Photocopies of maps of the sites are enclosed.

We will object to any proposal for offshore deepwater disposal that does not meet the ocean disposal criteria. The chemical analysis data indicates that it should be safe to deposit at an upland site but a bio-analysis will be necessary if the spoil is dumped offshore.

We will continue our coordination with you on this project and to assist in further analysis of the potential of the spoil sites.

Sincerely yours,



Gordon E. Beckett
Supervisor

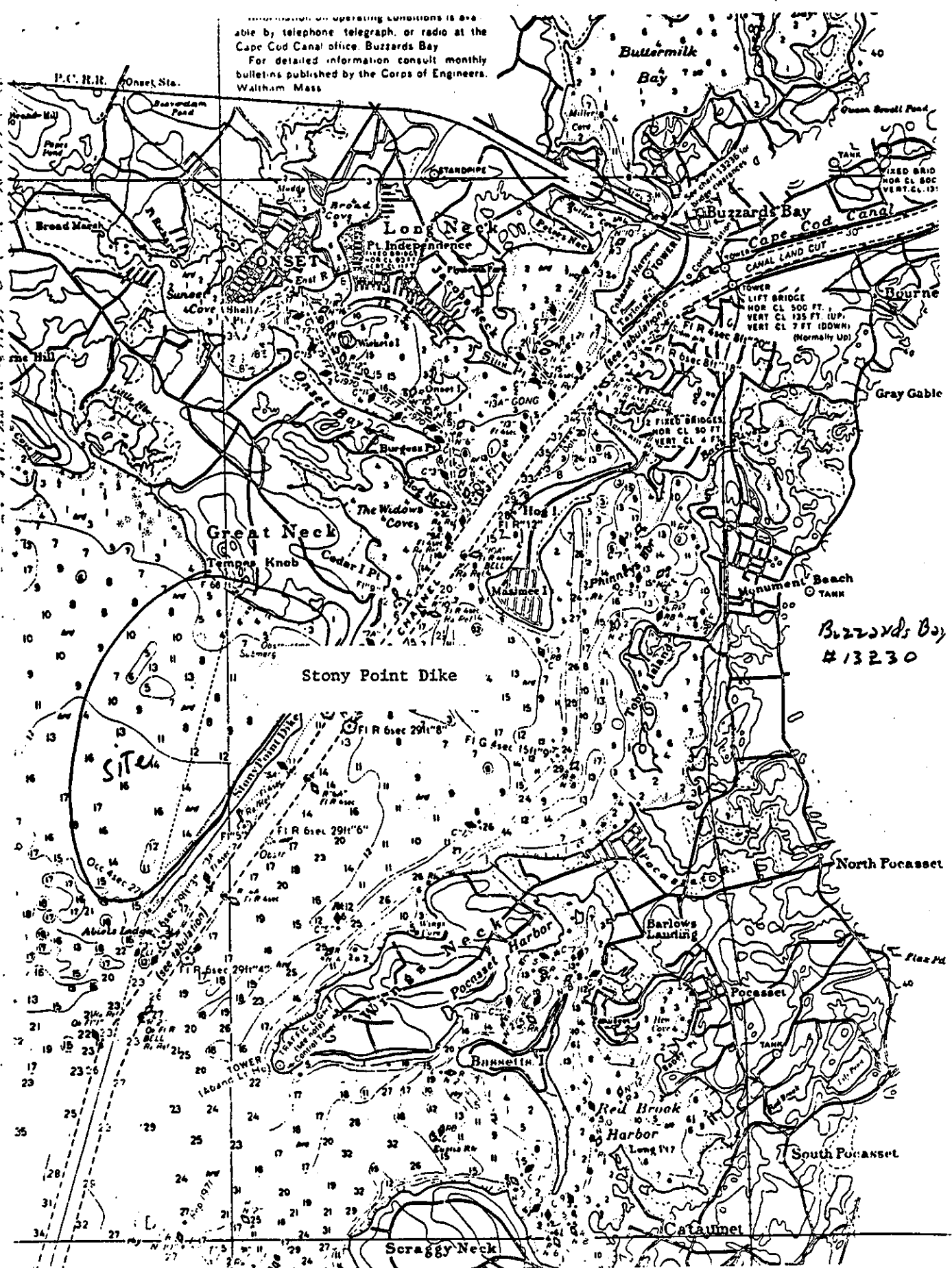
Enclosures

List of Possible Breeding Birds at Project Area 1/

Bobwhite
Ring-necked Pheasant
Rock Dove
Mourning Dove
Eastern Kingbird
Tree Swallow
Blue Jay
Black-capped Chickadee
Tufted Titmouse
White-breasted Nuthatch
House Wren
Mockingbird
Gray Catbird
Brown Thrasher
American Robin
Starling
Common Yellowthroat
Yellow-breasted Chat
House Sparrow
Redwinged Blackbird
Common Grackle
Brown-headed Cowbird
Cardinal
American Goldfinch
Rufous-sided Towhee
Savannah Sparrow
Chipping Sparrow
Song Sparrow
Killdeer
Eastern Meadowlark
Field Sparrow

1/ based on the Massachusetts Breeding Bird Atlas, 1974-1978, Massachusetts Audubon Society and Division of Fisheries and Wildlife.

Information on operating conditions is available by telephone, telegraph, or radio at the Cape Cod Canal office, Buzzards Bay. For detailed information consult monthly bulletins published by the Corps of Engineers, Waltham, Mass.

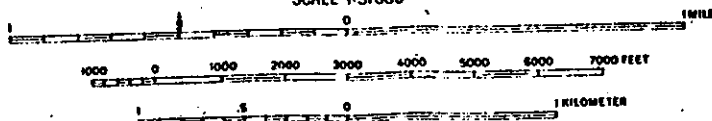


TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1953

SCALE 1:31680



CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

DEPTH CURVES AND SOUNDINGS IN FEET-DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 4 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Heavy-duty..	_____	Improved
Medium-duty..	_____	Unimproved
U. S. Route		State R

POCASS!
#61375-

15

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD



P.O. BOX 660
SANDWICH, MASSACHUSETTS 02563
TELEPHONE 888-0157

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

July 19, 1982

Corps of Engineers
Postal Development Branch
424 Trapelo Road
Waltham, MA 02254
Attn: Dirk Zwart

Dear Mr. Zwart,

As you had requested of us at our last meeting, the Board of Selectmen has selected four Marina plans from the total eight plans you originally submitted to us.

We understand that the perimeter configurations and other variables of the four preferred selections remain flexible and subject to change throughout the planning process.

With the help of our Harbormaster, Mr. Ed Moffitt and the Chairman of our Marina Committee, Mr. Don Cianciolo, we have chosen the Plans B, D, E and F as submitted to us most recently in your "East Boat Basin Study".

We look forward to hearing from you as we enter into Phase III of the Marina Project.

Very truly yours,

BOARD OF SELECTMEN


Joan M. Russell

JMR/jb



ANTHONY D. CORTESE, Sc. D.
Commissioner

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Water Pollution Control
One Winter Street, Boston 02108

October 13, 1982

Joseph L. Ignazio, Chief
Planning Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Re: Navigation Study
East Boat Basin
Sandwich

Dear Mr. Ignazio:

This letter concerns this Division's review of the environmental study performed for the expansion of the East Boat Basin in Sandwich. These studies have involved characterization of material to be dredged and excavated from the development site as well as an identification of potentially available disposal sites.

From the information enclosed with your August 10, 1982 letter, it is apparent that the material to be removed from the project site can be classified, for the most part, as a Category One, Type A material. As identified by our regulations pertaining to disposal of material into waters of the Commonwealth (314 C.M.R. 9.00), this material is approvable for placement at the sites mentioned in your assessment. A site that may not normally be approved would be an open ocean site characterized as having low energy dynamics and naturally occurring silty bottoms. None of the sites listed in your reports fall into this prohibitive category.

However, we would like to see the excavated material be put to beneficial use, rather than being merely disposed. A site that could certainly use the material is Sandwich Town Beach. Accelerated erosion has occurred at the the Town Beach due to the construction of the Cape Cod Canal jetties. The sand transport system has been disrupted by these jetties, resulting in a build-up of beach area at Scusset Beach at the expense of Sandwich Town Beach. While the erosion problem will not end as a result of the placement of the East Boat Basin Project material, it would retard the accelerated loss of beach frontage from the beach by littoral currents and would likely be a source of sand for areas down drift of this site.

We would also appreciate being notified of plans for the handling and disposal of sewage from the service facilities. Permits for discharge of sewage or for construction of public rest rooms facilities may be required.

Please keep this Division informed of the progress of this project. Any questions relating to our comments should be directed to Richard Tomczyk at 292-5672.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Thomas C. McMahon", written in a cursive style.

Thomas C. McMahon
Director

TCM/RT/wp



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

October 22, 1982

Joseph L. Ignazio
Chief, Planning Division
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

Dear Mr. Ignazio:

This letter concerns our review of the on-going navigation study for expansion of the "East Boat Basin" in Sandwich, Massachusetts by the Army Corps of Engineers.

Based on the physical and chemical testing data of the material to be dredged, we find the dredged material for any of the proposed four alternative plans of basin improvement (A,B,C,D) to be acceptable for either ocean or upland disposal.

The alternatives which warrant further investigation are alternatives number 3, 5, and 6, or a combined use of them. Each of these three alternative sites (3,5,6) could accommodate the dredged material with short-term limited environmental effects. Alternative #6 should particularly be investigated because of the benefits that could be derived from the creation of a tidal saltmarsh. This alternative would provide mitigation for some of the habitat loss from dredging and proposed placement of riprap revetment.

Finally, on the proposed vessel alignment within the basin, it would be most advantageous to put the commercial vessels nearest to the canal entrance. These vessels would be using the facility daily while recreational boats would use it only seasonally.

Thank you for the opportunity to comment on this on-going navigation improvement study, and please keep us informed of its progress by contacting Mr. Melvin Holmes at 223-5061.

Sincerely

Clyde F. Shufelt

Clyde F. Shufelt, Chief
Municipal Permits Section
Water Quality Branch

cc: USFWS, Concord, NH
NMFS, Gloucester, MA
MACAM, Boston, MA



COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

November 5, 1982

Mr. Joseph L. Ignazio
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Mr. Ignazio:

This letter is written in response to the Corp's request for comments regarding the East Boat Basin Expansion Navigation Study. That project involves the excavation of land owned by the Town of Sandwich and dredging for the enlargement of the existing harbor. The additional space created by this expansion will be used to increase dockage space for commercial fishing boats and support facilities for the fishing industry. You have requested comments regarding the configuration and design of the harbor as well as the site options for disposal of the dredged and excavated material. Our comments on the proposed plans for the harbor expansion are as follows:

Preferred Design Alternatives

The project feasibility report, which was funded by the Massachusetts Coastal Zone Management Office and compiled by Tibbetts Engineering, supports plans which would separate commercial and recreational vessel berthing areas within the East Boat Basin. According to the report, "recreational boats would find it an advantage to be removed from the boating traffic created by the commercial boats". Corps plans A and C which recommend that recreational and commercial activities be separated into the east and west ends of the Basin would satisfy the needs of both user groups. The East Boat Basin freezes during the winter, with the east portion of the basin freezing earlier in the year than the west portion (entrance). Since recreational boating activities are at a minimum at that time and commercial activities are still at a high level it makes sense that recreational activities should be in the eastern portion of the basin and the commercial vessel activity should be located in the western portion of the basin as close to the entrance to the Cape Cod Canal as is feasible. The design alternative proposed by plans A and C seem to achieve two things: (1) reduce traffic conflicts between recreational and commercial vessels and (2) facilitate commercial vessel access to open water during the winter months.

However, of the two plans cited above, the Office of Coastal Zone Management supports the utilization of Design Plan C because it creates larger areas for both commercial and recreational vessels to maneuver and anchor than does Plan A. The project benefit/cost ratio would probably increase with the utilization of the larger plan because the expanding fishing industry on Cape Cod would have little problem fully utilizing the new area.

Disposal Alternatives

Policy 5 of the Massachusetts Coastal Zone Management Program states that:

"On-land disposal of dredged material should be favored over ocean dumping, if appropriate sites are available, adverse environmental impacts such as degradation of groundwater can be minimized, and costs are feasible."

Two of the upland, in-harbor disposal site alternatives identified by the Corps appear to be viable options and should be examined in more detail. They are: (1) marsh creation at Stony Point dike in Wareham, and (2) disposal at Camp Edwards Military Reservation. Marsh creation is CZM's preferred priority for the disposal of the sediments. As stated in the May 20, 1982 letter of the U.S. Fish and Wildlife Service, this option would replace habitat that was buried by the original filling at Stony Point. Marsh creation would also greatly increase the project's environmental benefit/environmental cost ratio. In addition, this would be an excellent chance to utilize this method of disposal in the Commonwealth and thereby increase the chances of it being utilized in other dredging projects in the state. Upland disposal at the military site, appears to have little environmental benefit, but also minimal environmental impacts, and it should be evaluated further.

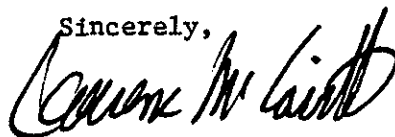
The other upland alternatives presented are not considered viable options because they would either result in a negative environmental impact at the disposal site (i.e., filling the steep bowl-like depression near the landfill; placing gravel or fine grained material on the Sandwich Town Beach) or they would preclude a previously existing use (i.e., use of the Crane Wildlife Management Area Land which is dedicated for wildlife conservation use; or use of the Corps of Engineers Gravel Pit which could not be mined after dredged material disposal).

Ocean disposal of the material at the Boston Foul Area is a potential alternative if the dredged and excavated material is judged "acceptable for ocean disposal" based on bioassay/bioaccumulation testing. Disposal in Cape Cod Bay is not a likely alternative at the present time because the state MEPA Office has required that an Environmental Impact Report be prepared and a disposal site formally designated before material other than the Wellfleet dredge sediments may be disposed of in the Bay. This would be a costly, time consuming process and one not likely to occur by the time the East Boat Basin expansion is constructed.

Mr. Joseph L. Ignazio
November 5, 1982
Page 3

Finally, it should be noted that the Town Selectmen of Sandwich have notified our office of the Corp's proposal to sell the federal portion of the East Boat Basin to the town. Should this purchase occur, planning considerations for the harbor and its expansion will likely change. At that time, MCZM will offer updated planning comments which will reflect these changes. For further correspondence on this project, please call myself or Harriet Diamond of my staff.

Sincerely,



Richard F. Delaney
for Director

RFD:HD:bam



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Services Division
Habitat Protection Branch
7 Pleasant Street
Gloucester, MA 01930

December 14, 1982

Mr. Joseph Ignazio
Planning Division
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02254.

Dear Mr. Ignazio:

This is in regard to the ongoing navigation study for the expansion of the East Boat Basin in Sandwich, Massachusetts.

The National Marine Fisheries Service (NMFS) has reviewed the four alternative plans for improvement, (A, B, C, D) and determined that any of the proposed alternatives are acceptable. Each alternative will involve expansion of the existing boat basin and creation of additional aquatic access for the public by excavating upland.

The material in question is poorly sorted containing particle sizes ranging from course gravel to silt and clay, with approximately 25% being the silt and clay fraction. Disposal of this material would increase water column turbidity in the vicinity of the dumpsite. If disposal occurred at an inshore area such as a site in Buzzards Bay, the increased turbidity could negatively impact inshore fishery resources by smothering planktonic larvae, and fouling gills of finfish, lobsters, and other invertebrates. In addition the disposal mound created by the approximately 1,000,000 cubic yards of material probably would be spread out by storm activity, thereby increasing impacts to nearby fishery resources by burial of habitat.

We recommend upland disposal alternatives be sought. We suggest that disposal alternatives 1, 3, 4 be investigated further. In addition, other municipal sanitary landfills, private individuals, or local businesses in the vicinity of the project may be able to use some or all of the excavated material. If all the excavated material could not be used immediately, perhaps a suitable location could be found to stockpile the material for future use.

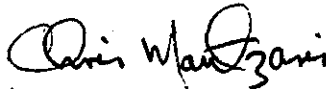
Should upland disposal be impractical, impacts to sensitive fisheries could be reduced if disposal occurred further offshore. Open ocean disposal at authorized dumpsite would be preferable to near-shore disposal. In fact, disposal of this material at the Boston Foul dumpsite may be desirable since it would form a "defacto" cap on top of more polluted, previously dumped dredged material.



To summarize, while the material proposed for excavation would be free of contaminants and be suitable for aquatic disposal, the physical impact from disposal operations on fishery resources could be significant. We recommend an upland disposal alternative be sought.

Please direct questions or comments regarding this project to Mr. Gene Crouch (FTS 837-9317) of my staff.

Sincerely,


for Ruth Rehfus
Branch Chief



ANTHONY D. CORTESE Sc. D
Commissioner

PAUL T. ANDERSON
Regional Environmental Engineer

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Southeast Region
Lakeville Hospital, Lakeville, Massachusetts 02346
947-1231, EXT. 680-684

January 10, 1983

Mr. Joseph Horowitz
Department of the Army
New England Division, C.O.E.
424 Trapelo Road
Waltham, Massachusetts 02254

RE: SANDWICH--NEDPL-C, East Boat Basin

Dear Mr. Horowitz:

As a follow-up to your telephone conversation with Robert Stevens, of the Wetlands Protection staff, we would like to make the following comments on the various options under consideration for the East Boat Basin project. These comments result from project review by members of our Solid Waste and Wetlands Protection staff.

The disposal of marine dredged material presents the major problem to be resolved for the East Boat Basin project. The disposal alternatives are evaluated below in order of acceptability and preferability based on environmental considerations. We have used your numbering and site location descriptions for identification purposes.

#8 C.O.E. - Gravel Pit at the Canal Midway Station - This is the best upland site from a purely environmental perspective because of the proximity of the canal and the local groundwater table gradient. Any chlorides that would be leached out of the marine dredge material would flow directly into the canal, with no possibility of water supply contamination. This site characteristic might also allow recycling of the old fill material which will now be removed to enlarge the basin. If sufficient area is available, then the re-excavated fill could be stockpiled (for several months or longer), to allow rain water to leach out the salts.

#1. Existing Sandwich Sanitary Landfill

#2. Depression to the North of the Sandwich Sanitary Landfill - These sites are both good potential disposal sites. The landfill may be able to handle considerable volumes of material. Due to their location, chloride contamination of public water supplies is not of concern for these sites.

#5. Sandwich Town Beach on the South side of the Cape Cod Canal - If material of compatible grain size distribution is available, then this beach nourishment option should be given highest priority. However, from the data presently available, the sediments may not be appropriate in grain size distribution. Only sample A appears to be even close to compatible and the silt and clay is at a maximum (approximately 16%) for beach nourishment. The high gravel content (approximately 20%) may not be

desirable for recreational purposes. The remaining samples reported show far too much silt and clay to be used for beach nourishment, despite being chemically clean. Additional sampling and size analyses will be needed to properly determine if this option is feasible and, if so, to clearly delineate the extent of appropriate material.

#6. Along the Inland Side of Stony Point Dike in Wareham - This option may be an acceptable alternative, but would require specific approval from the Division of Marine Fisheries before the Department would support it. The implementation of this option must result in beneficial habitat creation to warrant serious consideration.

#3. Valley Along the Eastern Border of Camp Edwards

#4. Stump Dump off Route 130, South of the Sandwich Sanitary Landfill - In our opinion, these two sites are questionable at best. They may be upgradient of the town's gravel packed well and would require considerable additional testing and research to be shown to be sound alternatives. They represent borderline cases of inland disposal sites for marine sediments.

#7. Gravel Pit on the Crane Wildlife Management Area - This site is inappropriate for disposal of marine sediments. It is too far inland and is too close to Ashumet Pond and its associated watershed. The potential for chloride contamination of this fresh water system and nearby wells should eliminate this site from further consideration.

#9. Disposal in '404' Waters - This disposal option may be appropriate, but selection of a specific site and additional testing of the sediments will be required to allow evaluation.

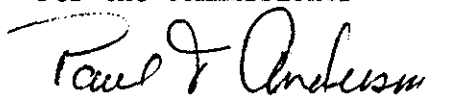
#10. Ocean Disposal - Due to the cost factor imposed by the distance to the Massachusetts Bay Foul Area from Sandwich, this option is probably not feasible. As indicated by you, additional testing would be necessary to complete an environmental review.

With regard to the four basin configuration plans under consideration, the issue of dredge material disposal is the major factor influencing any preference based on environmental concerns. Plan A involves the smallest volume of dredged material (and total volume) and therefore presents the smallest disposal problem of the four options. For this reason, the order of preference for basin plans is A, C, B and D. From a navigational perspective, Plans A and C appear to minimize the potential for mixing of commercial and recreational boat traffic.

Thank you for this opportunity to comment on this project during the planning stages. We hope that our comments will prove helpful in your decision making for the East Boat Basin Project. If you have any questions, please feel free to contact Mr. Robert Stevens at 727-1440, ext. 680.

Very truly yours,

For the Commissioner



Paul T. Anderson, P.E.
Regional Environmental Engineer

Boston University

Center for International Relations
152 Bay State Road
Boston, Massachusetts 02215
617/353-9278



Great Neck Road
Wareham, MA 02571

February 24, 1983

Wareham Board of Selectmen
Town Hall
Wareham, Massachusetts 02571

Dear Selectmen:

I write to oppose and protest the proposal of the Army Corps of Engineers to dispose of material "somewhere behind the Stony Point Dike" to facilitate the expansion of the East Boat Basin in Sandwich. I protest as a life-long summer resident (66 years) of Wareham on Great Neck and as a taxpayer since 1952 (31 years).

The disposal of the fill will add to the already serious silting problem behind the dike which already affects adversely all the residents, year-round and summer, on Great Neck between Tempes Knob and the Stony Point Dike. This area is suitable for recreational sailing, swimming and fishing and commercial shell-fishing. These usages will be harmed by the proposed fill to create a marsh. There is plenty of marshland already in the area of the dike.

Sincerely yours,

Daniel S. Cheever

Daniel S. Cheever
Associate Director

DSC:cc

cc: Mr. Alexander Whiteside
Mr. Charles E. Cheever
Mr. D. S. Cheever, Jr.
Mr. Joseph L. Ignazi
Ms. Judith Montminy
Mr. & Mrs. Colin Canham

RICHARD BANCROFT
WILLIAM B. SLEIGH, JR.
HOWARD S. WHITESIDE
ALLAN R. ROSENBERG
JOHN G. VAN DUSEN
ALEXANDER WHITESIDE

Putnam, Bell & Russell

Attorneys at Law
131 State Street
Boston, Massachusetts 02109-3392
(617) 723-3131

February 24, 1983

Board of Selectmen
Town Hall
Wareham, Mass. 02571

Re: Stony Point Dike

Dear Sirs/Madam:

I own a house and land at the base of the Stony Point Dike on Great Neck. I was born in this house at a time before the dike was built. After its construction in the 1930s, the dike began to spread and also to trap sand driven to shore by the Southwest wind. The result has been a very severe silting problem in our part of the bay extending all the way to the Wareham River. The cove in front of my house now becomes so shallow at low tide that there is barely enough water to swim in. It seems inevitable that if the Corps of Engineers dumps 500,000 to 1,000,000 cubic yards of dredged material in this area, the cove will disappear for all intents and purposes and areas such as Little Harbor and Bourne's Cove will suffer accelerated accretion.

I am writing to urge your opposition to what seems to be totally unnecessary damage to a fairly large part of the town's waterfront. Clearly, no more fill is needed in this area. Many other sections of Massachusetts waterfront, which are suffering severe erosion, would seem to be much more suitable areas for the Corps to dump its dredgings. Indeed, our area of Buzzards Bay should itself be dredged to remove the silting caused by the construction of the dike.

I can see no benefit to the town by compounding what is already a serious problem on a long stretch of the town's shoreline. I also think that trucking the material on Great Neck Road and on the narrow dirt road from the Sacred Heart Seminary to the dike will not only damage the roads but also will endanger the people and animals in the area. The Selectmen should vote that this unwanted fill be kept out of Wareham's water.

Sincerely yours,

Howard S. Whiteside
Howard S. Whiteside

HSW/r

✓cc: Joseph L. Ignazio
Chief, Planning Division, U.S. Army Corps of Engineers

February 25, 1983

To the Selectmen
Town of Wareham
Massachusetts 02571

Dear Sirs:

Over sixty years ago, after his return from W.W.I. and after giving the question much deliberation, my father, General John H. Sherburne of Brookline, bought our Wareham house. This is an 1880 type, on the shore between Tempe's Knob and Little Harbor. Four generations of us have summered there very happily, enjoying the temperature of the water, the southwest wind that usually blows up the Bay in the afternoon, the sailing, fishing, swimming, windsurfing, and all the other pleasures of that beautiful area.

Many people live on that shore, and come to use it - - some for longer than we have.

We are concerned to read of the Corps of Engineers' thought of dumping half a million to a million cubic yards of fill, trucked in all the way from Sandwich, and placing it behind the dike. The access roads are tiny and rough. And there is much worry lest there be more silting at the head of the beautiful Bay.

We hope that your Board will not act favorably on this idea - surely there are many places, much nearer to Sandwich, which could use this clean fill to advantage.

Sincerely yours,

Alice Sherburne Reidy

Alice Sherburne Reidy

John A. Reidy

John A. Reidy

Owner

John Sherburne Reidy

Owner

Sherburne Reidy Worthen

✓ Copy to Mr. Ignazio

n. y.
Min.
nasota

Daniel S. Cheever, Jr.
8 Cedar Rd.
Lincoln, MA 01773

February 28, 1983

Board of Selectmen
Wareham Town Hall
54 Marion Road
Wareham, Massachusetts 02571

Dear Members of the Board of Selectmen:

I own property off Great Neck Road (lot 1000D) in Wareham and will be establishing my legal residence there in July. I am writing to express my serious objection to the U. S. Army Corps of Engineers' proposal to fill an area behind Stony Point Dike with 500,000 to 1,000,000 cubic yards of fill from the East Boat Basin in Sandwich. As the Town's elected leaders, I hope you will consider these objections as you prepare your response to the Corps of Engineers.

I have several concerns about this proposal. First, I gather the location has been chosen because of its potential as a site for marsh development. Frankly I'm skeptical of the likelihood of a marsh ever developing along the dike. The prevailing tidal flow to the west -- which has already led to the filling in of the upper portion of the bay since the dike was first built -- coupled with the wave action from the prevailing southwest wind makes it highly likely that the fill will simply erode to the northern end of the bay. A marsh might develop along the northern shore in fifty years, but in the interim there will be an awful mess.

Second, the trucking and dumping of such a staggering amount of fill will do significant damage to existing wildlife and marine habitats. As you know, the dike itself is the breeding and nesting ground for many species of birds, and valuable shellfish beds have been established in the waters along the northwestern shore of the dike. A convoy of enormous trucks dumping 500,000 to 1,000,000 cubic yards of fill will do serious environmental damage to a lovely, valuable area.

Third, that convoy of trucks will also do some damage to all of Great Neck Road and the related approaches to the dike. The trucks will pose a traffic hazard on a narrow, winding road which scarcely can accommodate the normal traffic to and from the many homes in the area. As you know, Great Neck Road is a long road, with many clusters of dwellings in neighborhoods off its side roads. There are a great many children along the route, as well as joggers, bicyclers, and families walking along the road due to the absence of sidewalks or a suitable road shoulder. The potential for serious accidents is high, not to mention the expenses likely to accrue to the Town for traffic control, signs, road repairs, and potential claims of liability.

Finally, if the fill is coming from the enlargement of the East Boat Basin then it will inevitably contain oil and other chemical or petrochemical pollutants, despite the Corps' attempts to insure the fill is clean. These pollutants will do further damage to marine and wildlife in the upper bay, not to mention pose a threat to the many swimmers, sailors, and fishermen along that shore. The public beach at Little Harbor is only a short distance away, and the upper bay and dike are used by hundreds of people daily during the summer. We are concerned enough already about possibly dangerous pollutants coming up the bay from the areas in New Bedford and Fall River determined as hazardous by the EPA. We do not need to add to the problem.

It is tempting to argue that if the fill is coming from Sandwich then it should be dumped somewhere in Sandwich. I realize that may not be possible, but urge you to take every action necessary to prevent the fill from being dumped in Wareham.

Thank you for considering these comments.

Sincerely,

Daniel S. Cheever, Jr.

dsc/mb



TOWN OF WAREHAM

Wareham, Mass. 02571

February 28, 1983

Department of The Army
New England Division Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

Attention: Planning Division
Coastal Development Branch

Dear Sirs:

In response to your letter dated February 4, 1983 concerning the expansion of the East Boat Basin in Sandwich, Massachusetts, and the desire to use part of our waters on the back side of Stoney Point Dike as a disposal area for the 500,000 to 1,000,000 cubic yards of material coming from the Sandwich Basin project, the area in question is used in the summer season for a recreational sailboat anchorage for citizens from every town in the area, Falmouth, Pocasset, Bourne, Wareham, Mattapoisett, Marion and Sandwich, just to mention a few, who visit this area all summer to find a sheltered area with deep enough water to accomodate a sailboat.

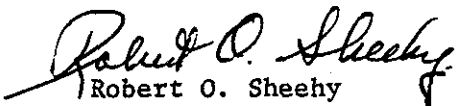
The area in question, in fact, the whole back side of the Stoney Point Dike, is one of the best bay scallop producing areas in the whole town of Wareham. Any change in that area would play a negative role in our shellfish propagation program.


Wareham's Marine Resources Commission and the Shellfish Department oppose any such project using this area as a disposal site for the material coming from the expansion of Sandwich Basin or for any other reason.

It is also our understanding from talking to a Mr. Zwart in Boston, that, if this site was chosen, the material in question would be trucked in, which would mean a lot of wear and tear on our Town roads, which I'm sure will have quite an impact on the Municipal Maintenance Department for repairs to roads caused by this project.

In summary, the Town of Wareham's Marine Resources Commission and the Shellfish Constable of the Town are unalterably opposed to this proposed filling project.

Very truly yours,


Robert O. Sheehy
Shellfish Constable


Dana C. Keyes, Chairman
Marine Resources Commission

ROS:es

cc: file
Board of Selectmen
Town Administrator



TOWN OF WAREHAM

Wareham, Mass. 02571

John F. Healey
Town Administrator

March 2, 1983

Joseph L. Ignazio
Chief, Planning Division
Department of the Army
Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

Dear Mr. Ignazio:

The Town of Wareham Board of Selectmen, Town Administrator, Shellfish Constable, Marine Resources Commission, Conservation Commission and concerned residents vigorously oppose the proposed filling project at Stoney Point Dike. Dumping fill from the East Boat Basin in Sandwich off the Stoney Point Dike will create extensive environmental and other physical damage to the Town of Wareham and abutting property owners.

Rather than detailing our objectives at this time, the Town should be recorded in general opposition. We would appreciate it if you could forward to us any detailed plans and all information on the proposed project as it is developed so that we can keep ourselves informed. Similarly, we must ask you to detail the process that must be followed including any Federal, State or local agency approvals that will be required before the project can be carried out.

Very truly yours,

John F. Healey
Town Administrator

JFH/dg

CC: file
Board of Selectmen



United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. BOX 1518
CONCORD, NEW HAMPSHIRE 03301

Colonel Carl B. Sciple
Division Engineer
New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

MAY 11 1983

Dear Colonel Sciple:

This responds to the May 9, 1983, telephone request by Mr. Joe Horowitz of your staff for information on the presence of Federally listed and proposed endangered or threatened species within the disposal area that has been selected for the proposed East Boat Basin project. This disposal area is located at the so-called Boston Foul dumpsite in Massachusetts Bay.

Our review shows that except for occasional transient individuals, no Federally listed or proposed species under our jurisdiction are known to exist in the project impact areas. Therefore, no Biological Assessment or further consultation is required with us under Section 7 of the Endangered Species Act. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address other legislation or our concerns under the Fish and Wildlife Coordination Act.

A list of Federally designated endangered and threatened species in Massachusetts is enclosed for your information. Thank you for your cooperation and please contact us if we can be of further assistance.

Sincerely yours,

Gordon E. Beckett
Supervisor,
New England Field Office

Enclosure

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES
IN MASSACHUSETTS

Common Name	Scientific Name	Status	Distribution
<u>FISHES:</u>			
Sturgeon, shortnose*	<u>Acipenser brevirostrum</u>	E	Connecticut River and Atlantic Coastal waters
<u>REPTILES:</u>			
Turtle, green*	<u>Chelonia mydas</u>	T	Oceanic straggler in Southern New England
Turtle, hawksbill*	<u>Eretmochelys imbricata</u>	E	Oceanic straggler in Southern New England
Turtle, leatherback*	<u>Dermochelys coriacea</u>	E	Oceanic summer resident
Turtle, loggerhead*	<u>Caretta caretta</u>	T	Oceanic summer resident
Turtle, Atlantic ridley*	<u>Lepidochelys kempii</u>	E	Oceanic summer resident
Turtle, Plymouth red- bellied	<u>Chrysemys rubriventris</u> <u>bangsi</u>	E	Plymouth and Dukes Counties
<u>BIRDS:</u>			
Eagle, bald	<u>Haliaeetus leucocephalus</u>	E	Entire state
Falcon, American peregrine	<u>Falco peregrinus anatum</u>	E	Entire state - re-establishment to former breeding range in progress
Falcon, Arctic peregrine	<u>Falco peregrinus tundrius</u>	E	Entire state Migratory - no nesting
<u>MAMMALS:</u>			
Cougar, eastern	<u>Felis concolor cougar</u>	E	Entire state - may be extinct
Whale, blue*	<u>Balaenoptera musculus</u>	E	Oceanic
Whale, finback*	<u>Balaenoptera physalus</u>	E	Oceanic
Whale, humpback*	<u>Megaptera novaeangliae</u>	E	Oceanic
Whale, right*	<u>Eubalaena spp. (all species)</u>	E	Oceanic
Whale, sei*	<u>Balaenoptera borealis</u>	E	Oceanic
Whale, sperm*	<u>Physeter catodon</u>	E	Oceanic
<u>MOLLUSKS:</u>			
NONE			
<u>PLANTS:</u>			
Small Whorled Pogonia	<u>Isotria meleoloides</u>	E	Hampshire County

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service



BARRY H. JOHNSON, CHAIRMAN
ROBERT W. PARADY
ROBERT J. KILDUFF

TOWN OF BOURNE
BOARD OF SELECTMEN
24 Perry Avenue
BUZZARDS BAY, MASS. 02532
TEL. 759-4486



May 18, 1983

Mr. Joseph L. Ignazio, Chief
Planning Division
Department of the Army
424 Trapelo Road
Waltham, MA 02254

Re: Proposed Dump Site to Receive Dredged Material
From the East Boat Basin in Sandwich, Mass.

Dear Mr. Ignazio:

Please consider this our response to your letter in which request our comments regarding possible "dump sites" for the above-mentioned job which are located within our town.

We wish to inform you that the land as outlined in your letter has been designated as owned by Mr. Joseph Sorenti.

Regarding the additional parcels which are located behind Mr. Sorenti's land, please be informed that the 1982 town meeting membership voted to authorize the Board of Selectmen to convey same to the North Sagamore Water District for acquifer protection.

It was presented to the town meeting membership that if they voted this authorization, the land in question would remain in its natural state for the previously named purpose.

Therefore, it is our unanimous opinion that these particular parcels should not be used to receive dredged




Mr. Joseph L. Ignazio
May 18, 1983
Page 2

material.

If you have any further comments or questions in this matter, please do not hesitate to contact us in this matter.

Sincerely yours,

BOARD OF SELECTMEN


Barry H. Johnson

Robert W. Parady

Robert J. Kilduff

BHJ/njs

cc: Sandwich Board of Selectmen



TOWN OF BOURNE

TOWN CLERK and TREASURER

24 Perry Avenue

Buzzards Bay, MA 02532



Tel 759-4417 or 4418

Mary C. McDonough

April 21, 1983

At the Annual Town Meeting held May 10, 1982, at the Bourne High School, a quorum being present, the warrant having been posted seven days before in the eight post offices and the Bourne Town Hall, the following article was voted on:

ARTICLE 46. To see if the Town will vote to authorize the Board of Selectmen to convey to the North Sagamore Water District five (5) certain parcels of real estate in Bourne (North Sagamore), Barnstable County, being shown on Assessors' Map 6 as Parcels 9, 10, 11, 12 and 22, or act anything thereon. Request of the North Sagamore Water District Commissioners

We move that the Town vote to authorize the Board of Selectmen to convey certain parcels of land described in this Article to the North Sagamore Water District for the purpose of providing water resource and water shed protection.

VOTED: Unanimous Vote. Motion Passes

A TRUE COPY ATTEST:

Mary C. McDonough

MARY C. McDONOUGH
TOWN CLERK



NORTH SAGAMORE WATER DISTRICT

P.O. BOX 133, 14 SQUANTO RD.
SAGAMORE BEACH, MA 02562

May 20, 1983

Joseph L. Ignazio, Chief
Planning Division
Department of the Army
424 Trapelo Rd.
Waltham, MA 02254

RE: EAST BOAT BASIN, Sandwich, Mass.
DISPOSAL OF PROJECT MATERIAL

It was the unanimous vote of the Board of Water Commissioners that permission NOT be granted to dump dredged material from the East Boat Basin in Sandwich at the site designated in your letter of May 17th as northwest of the Sagamore Bridge Rotary.

This area is a watershed area for our well near Black Pond and test wells have indicated a potential well site. Any salt in the dredge material would be a probable contaminant to the aquifer.

We feel that this land should remain in its natural state.

A handwritten signature in cursive script, reading "Charlotte L. Stiefel".

Charlotte L. Stiefel
Chairman, Board of Water
Commissioners

copy: Board of Selectmen
Town of Bourne



**MASSACHUSETTS
HISTORICAL
COMMISSION**

**COMMONWEALTH OF MASSACHUSETTS
Office of the Secretary of State**

294 Washington Street
Boston, Massachusetts
02108
617-727-8470

MICHAEL JOSEPH CONNOLLY
Secretary of State

May 20, 1983

Joseph Ignazio, Chief
Planning Division
Department of the Army
Corps of Engineers
424 Trapelo Road
Waltham, Mass 02254

RE: East Boat Basin, Cape Cod Canal, Sandwich

Dear Mr. Ignazio:

My staff has reviewed the materials received May 19, 1983, which you submitted describing the proposed expansion of the East Boat Basin at the Cape Cod Canal in Sandwich. After review of the material, it has been determined that your proposal will not affect significant cultural, historical, or archaeological resources.

This initial consultation to identify resources in the project area has been undertaken in accordance with 36CFR 800, the Advisory Council Regulations for the Protection of Cultural Resources. Since no significant resources were identified in the vicinity of the proposal, no further compliance with Council Procedures is required.

If you should have any questions, please contact Brona Simon of this office. Thank you for your cooperation.

Sincerely,

Valerie A. Talmage
State Archaeologist
Executive Director
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

xc: John Wilson, ACE

VAT/BS/1k



United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. BOX 1518
CONCORD, NEW HAMPSHIRE 03301

Colonel Carl B. Sciple
Division Engineer
New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

MAY 25 1983

Dear Colonel Sciple:

This Planning Aid Letter is intended to aid your study planning efforts for development of navigation improvements at East Boat Basin, Sandwich, Massachusetts. It has been prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.).

We understand that your selected plan, Plan C, would enlarge the existing boat basin by 11 acres (9.1 acres water, 1.9 acres riprap slope) through excavation of adjacent town-owned land. The expansion area would include a channel, turning/maneuvering area, commercial anchorage area, recreational anchorage area, and a fish offloading area. Depths at MLW would range from 14 feet for the channel and maneuvering area to 6 feet for the recreational anchorage area. A sheet steel bulkhead would front the offloading area and riprap would protect the remaining shoreline. Access to this expanded area would be provided by dredging a channel to a depth of 14 feet (MLW) with a width of 140 to 120 feet through the existing boat basin. This project would require the removal and disposal of about 535,000 cubic yards of material, comprised of 5.3 percent dredged material and 94.7 percent excavated material. We understand that the tentatively selected disposal site for this material is the Foul Area in Massachusetts Bay.

Dredging a channel through the existing basin would result in the physical destruction of most of the benthic organisms in the immediate work area. Additional adverse impacts to aquatic organisms would be associated with increased turbidity and sedimentation during the construction period. These adverse impacts are expected to be relatively minor and of short duration. No significant long-term adverse impacts are anticipated from the dredging per se.

Expansion of the basin through excavation would result in the permanent loss of about 11 acres of terrestrial habitat. The area to be excavated is composed largely of fill from construction of the existing basin and nearby powerplant. This area now supports a rather diverse community of grasses, forbs, shrubs and small trees. This habitat can be expected to substantially improve in future years as a result of successional changes. A small wetland area near the center of the site does not hold permanent surface water although at the time of our field inspection (April 21, 1983), it did contain sufficient water to be attractive to waterfowl and shorebirds.

One of the more common shrubs on the area to be excavated is bayberry (Myrica pensylvanica). The fruit of this shrub, in the northeast, is utilized by over 20 species of birds. Tree swallows in particular are partial to bayberry fruit and at times it can constitute up to 30 percent of the birds' diet. ^{1/} Overall, we believe that the area provides habitat of sufficient importance to small mammals and songbirds that its loss would warrant mitigation.

The degree of mitigation that can be achieved is dependent upon selection of a spoil disposal site where habitat can be created or significantly upgraded. We have reviewed your final array of disposal options (letter of April 20, 1983), and conclude that none of the sites afford an opportunity to create or upgrade habitat for mitigation purposes.

The two upland areas, Camp Edwards and the Sagamore Site, both support significant amounts of vegetation that provides habitat for a wide variety of wildlife species. Disposal of spoil at either of these sites would destroy existing vegetation and result in additional habitat losses.

Disposal of the material in open-water areas, such as the Cape Cod Canal Site, Wellfleet Site, and Buzzards Bay Dump Site, could negatively impact fishery resources by smothering planktonic larvae and fouling gills of finfish, lobsters, and other invertebrates. These adverse impacts would be reduced if the material was disposed of at the Boston Foul Area. Although the material in question is relatively clean and suitable for open-water disposal, such disposal would serve no useful purpose except to get rid of the material. It does not afford an opportunity to mitigate habitat losses associated with the East Boat Basin project.

Since your final array of disposal options did not produce an acceptable site for mitigation purposes, we have reevaluated sites that were dropped during previous screening efforts. On-going commercial development rules out the "Stump Dump Site." The large depression to the north of the Sandwich Sanitary Landfill is not acceptable since disposal would entail the loss of additional terrestrial habitat. Creation of a saltmarsh at Stony Point Dike is now ruled out since further investigation has revealed that there is a substantial quahog resource in this area.

In our reevaluation of potential disposal areas, we have found two areas where habitat could be created or upgraded in order to mitigate project-induced habitat losses. One of these areas is the Corps of Engineers' gravel pit at the Canal Midway Station. We realize that this is an active borrow area, however, due to its large size, it may be feasible to rehabilitate habitat on at least a portion of the area. This possibility should receive further investigation.

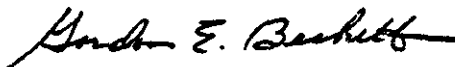
The inactive gravel pit on the Crane Wildlife Management Area probably affords the best opportunity for mitigation of habitat losses. Existing vegetation at this site is very sparse and provides poor wildlife habitat. The Massachusetts Division

^{1/} Martin, Alexander C., Herbert S. Zim and Arnold L. Nelson. 1951. American Wildlife and Plants - A Guide to Wildlife Food Habitats. Dover Publications, Inc. 1961.

of Fisheries and Wildlife does not object to spoil disposal in this area if it would improve existing habitat conditions. The Massachusetts Department of Environmental Quality Engineering (DEQE) eliminated this site from further consideration (letter of January 10, 1983) due to potential chloride contamination of Ashumet Pond. However, further coordination revealed that this Department (DEQE) would not object to disposal of clean excavated material at this site as long as chloride contamination was not a problem. Therefore, we recommend that the material to be excavated be tested for chlorides at surface and at depth and be coordinated with DEQE, MA DF&W, and FWS. We expect that a sufficient amount of material will be found acceptable for disposal at Crane to improve habitat within the gravel pit and thus mitigate habitat losses. If this is the case, then material not approved for disposal at Crane because of high chloride content could be disposed of at the Foul Area.

We strongly prefer that the dredged and excavated material be utilized to mitigate habitat losses or at least be put to some use that would benefit the environment. We will continue coordination with you on this project and to assist in further analysis of potential disposal sites.

Sincerely yours,



Gordon E. Beckett
Supervisor,
New England Field Office